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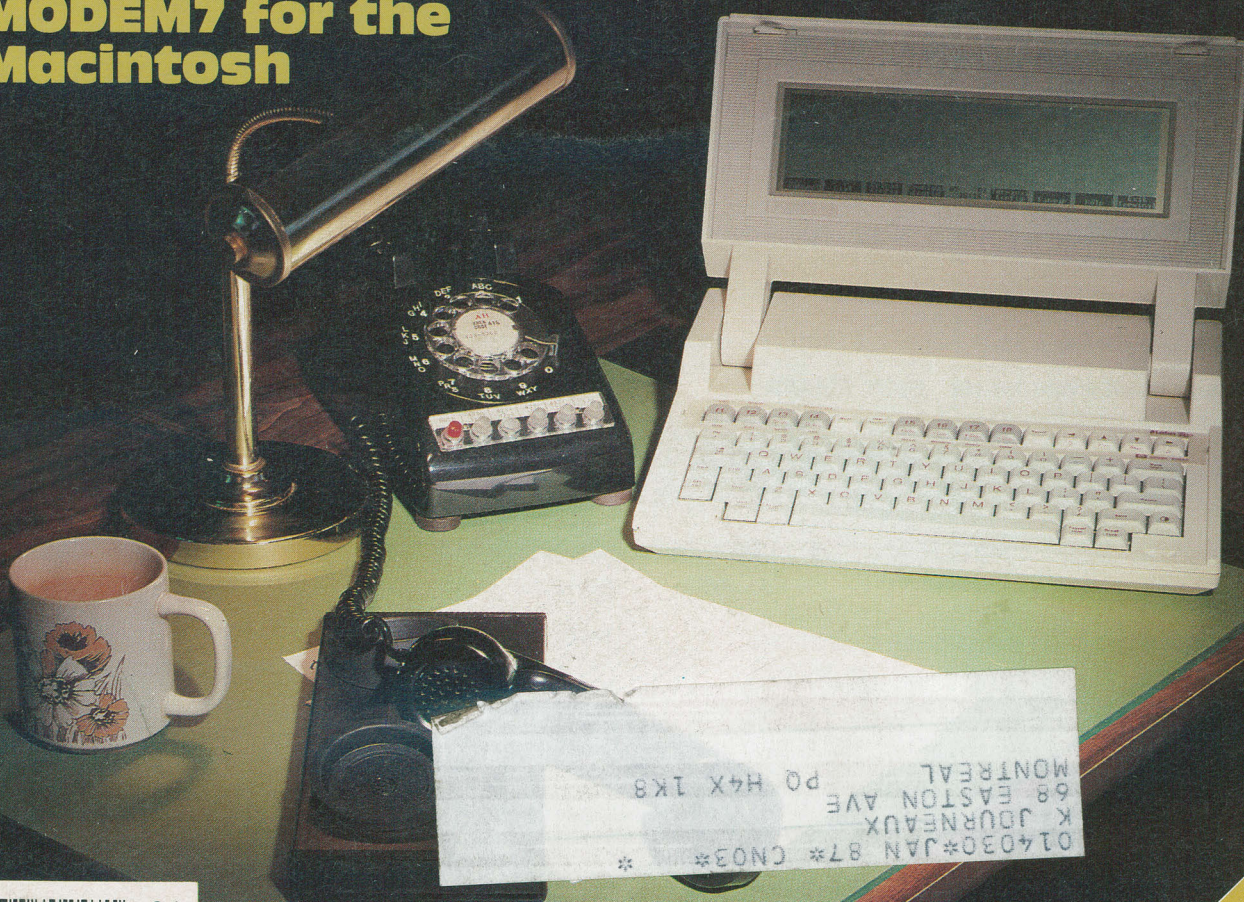
Canada's Personal Computing Magazine
January 1985

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Telecommunications

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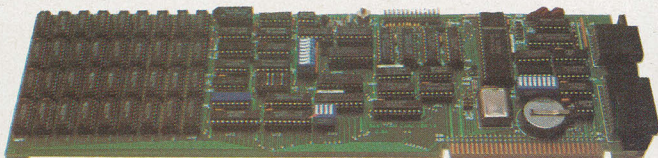
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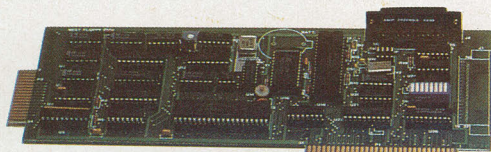
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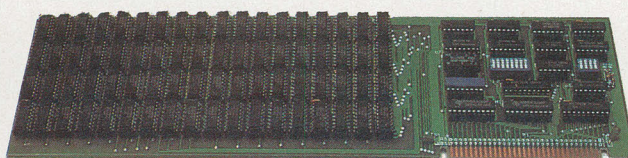


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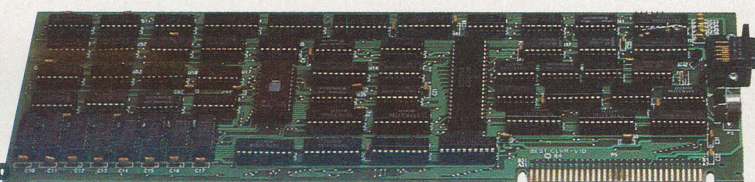
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Canada's Personal Computing Magazine

About this month's cover: This month's cover owes much to the thoughtful diligence of Arthur Nagels, who unselfishly relinquished his desk blotter. We are also indebted to Alonzo O'bivion, the nameless clerk at Woolco who found us a lamp that wasn't scratched. Cover photography by Steve Rimmer.

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Interactive Video



Learning through the use of books is quaint but a bit slow for a world that kills time nanosecond by nanosecond. Interactive video is the high tech answer to teachers.

by Frank Lenk

There are lots of ways of learning what you need to know. Come to think of it, there are lots of ways of learning lots of things that you don't really need to know. In these cases it's not too important that the educational process falls short of peak efficiency.

However, assuming there is something you really need to know, it seems that the more desperate you are to acquire the knowledge, the less time you've got to get it.

There are lots of ways of learning.

Everyone has their own methods. There are, for instance, the documentation worshippers... these folks seek to gain enlightenment by the diligent perusal of the standard paper that accompanies the often inscrutable outpourings from the realms of hardware and software. This arcane approach is not for everyone.

Some seekers of knowledge prefer to work with explanatory texts, hoping to win salvation by learning from the words of those that have gone before along the dark and treacherous paths of learning.

The more cautious prefer to approach the truth in the company of a guru. This way, indeed, hath many advantages. The only major drawback lies in finding a truly suitable guru, and in filling the cavernous collection plate that such potent individuals are wont to pass round at the end of the lesson.

Now there is a fourth way. It doesn't replace the manuals, the textbooks or the

teachers. It does offer some interesting advantages, though.

The combined efforts of many of the wisest instructors are coming to fruition in something known as "IVI" or Interactive Video Instruction. As stated by Advanced Systems Incorporated, one of the leading exponents of this new approach, the key is teaching technology through technology.

For those still hopelessly bewildered by micro technology, IVI could be a godsend. For the rest of us... it could still be a bit of a gas. Either way, you're going to be seeing a lot of interactive video very shortly. Advanced Systems, who really are rather far forward in this technology, gave me a preview.

I'll pass it along to you, now, both to expand your head and to keep the next few pages from being completely blank.

Another Video Game

With computer hardware and software proliferating at a dazzling rate, it is not impossi-

ble for a system to be obsolete by the time everyone is beginning to grasp what it's all about. We thus all move on to the next system, knowing in our hearts that it too will be phased out just about the time we've really learned how to use it.

For the individual this means a lot of futile effort and frustration. For a corporation, multiplied by thousands of maddened, inefficient employees, it shows up in those big buck amounts at the bottom of the annual report to the stockholders. It is not surprising that the dispensing of in depth information has become a multi million dollar enterprise in its own right.

Advanced Systems, better known as ASI, is one of only a handful of companies that have chosen to specialize in the field of delivering complex and difficult knowledge to corporate clients intravenously, as a pre-digested ready to use formula injected directly into the company's life's blood, its employees.

Since its inception in the late 1960's, ASI has branched its efforts out to encompass a number of educational strategies.

Like many other companies in this field, ASI still offers the conventional seminar type training sessions. Of course, the ASI catalog of courses is a couple of inches thick... offering everything from "Self Management and Motivation" to "IMS/VS DataBase Application Programming". These courses represent the least technological technique employed by ASI, dubbed "LED", or Live Education Delivery.

It is not impossible for a system to be obsolete by the time everyone is beginning to grasp what it's all about.

Four other "products" put into practice ASI's motto of "teaching technology through technology". VAI, for video assisted instruction, is an extension of the LED approach, with videotaped instruction permitting more individualized learning to

take place. Then there's a complete selection of CAI/CBT, computer assisted instruction / computer based training, courses, based on individual use of an interactive hardware and software package. Finally, there's the *MicroTutor* series of tutorial programs, dealing with popular applications programs such as WordStar and Lotus 1-2-3.

Slick and efficient as all these may be, they begin to look primitive by comparison with IVI, the latest addition to the ASI arsenal.

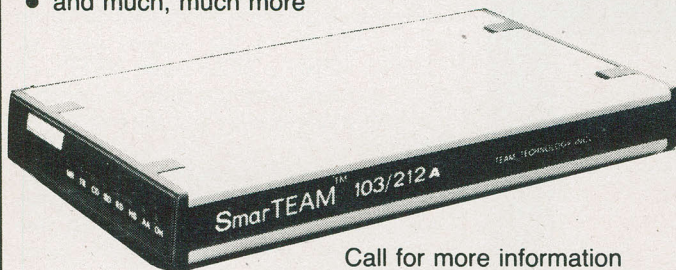
Interaction and Reaction

Anybody who's played the latest generation of video disk arcade games has had some exposure to the concept of interactive video. The idea, as far as it has been taken, is to marry the processing power of a microcomputer to the video storage capacity of a videodisk. Though there's little practical impediment to this union, it can't take place at a human level until someone is ready to go with a complete, debugged package that any fool can use.

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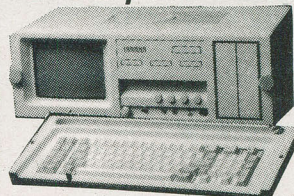


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Interactive Video

ASI is ready to go. Although the company has never had any aspirations towards becoming a supplier of hardware, it has primed the pump by getting together with Interactive Training Systems... not surprisingly, referred to as ITS. ITS has developed a videodisk interface, the ITS 2000, to connect the ubiquitous IBM PC to a videodisk player. This interface, styled to match the traditional beige PC housing, sits between the computer and the monitor. The ITS 2000 does the the job of letting the PC pull up whatever images it feels are appropriate from an attached videodisk player.

ITS is actually providing much of the expertise in educational psychology, investing about five million dollars over the next two years to develop interactive video courseware. Advanced Systems itself will also develop course modules and will provide worldwide distribution and support through its existing network of sales offices.

The IVI system is designed to work with a touch screen monitor. The ones being demonstrated by ASI were made by Electrohome, but there is no real restriction as to what can be plugged in. So too with the Sony videodisk machines. Nor is there anything magically unique about the ITS 2000 interface itself. In fact, ASI is hoping that many third party hardware specialists will take up the challenge and come out with their own designs.

All of this paraphernalia makes for a pretty well packed desktop, but it does leave the student staring right at the touch screen, ready to boot the course disks.

An IVI course package consists of three floppy disks plus a video disk. To start a

lesson, you first boot DOS, either from your own system disk or by virtue of having transferred it to one of the ASI disks. Having booted up, you must have the ASI program disk in drive one and your personal student disk in drive two.

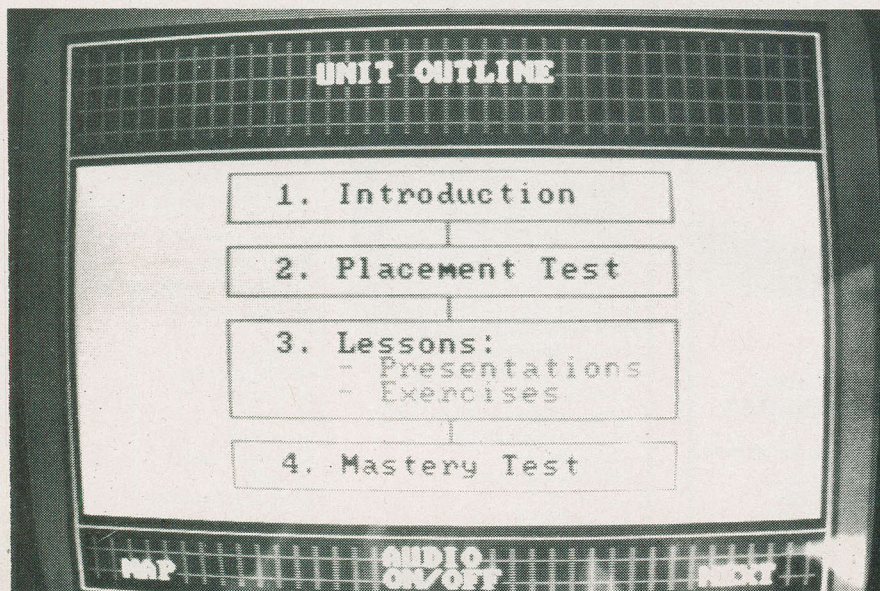
The program disk is the real intelligence of the IVI system, while the student disk is simply a storage location for information about your progress through the course.

The first display to come up is an hello screen, which prompts you to make sure you have everything configured properly. You are then guided through an initialization phase, which includes entering your name and password. Passwords make sure that your marking information stays private.

Finally you get to choose a lesson module. You are prompted to insert the correct lesson disk to replace the original program disk in drive one. If you've done all this properly, you'll be rewarded by a burst of music and computer animation welcoming you to your ASI course.

What course are you going to take?

**The IVI system is
designed to work with
a touch screen monitor.**



Introductory menu for an ASI lesson module.

Well, ASI intends to have at least fifty modules ready to go within the next year. Much of the material relates to operation of large mainframe systems. Typical modules might be "MVS/XA JES2: Basic Operator Training", or "IMS/VS: Advanced Data Communications Programming". How about "COBOL Programming with VSAM"... looks pretty lively.

This stuff may sound a bit obscure from the microcomputer point of view, but bear in mind that it's really just looking the leading edge. There'll also be things like Unix fundamentals, or even basic computer literacy.

Words And Pictures

The power of the IVI system becomes apparent as soon as you start your lesson. Right away you are presented with a block map of the module you're in the midst of. "You are here" is represented by a red asterisk. At this point you have a choice. You can start at square one... or you can jump right in to the block that seems to contain what you want to know.

Alternately, you can take a placement test. This will select at random some problems that test your present knowledge of the lesson subject matter. When you have completed this brief screening test the system will be able to tell you quite accurately just what block you're ready for.

The start up process needn't take much time. If you already know the ropes, you can by pass most of the options and get right into a lesson. That's when the system comes alive. No matter where you decide to dive in, you can always call up listings of prerequisites as well as suggested text reference sources.

As you would have found by this point, the videodisk based audio usually explains what the text screen shows. There are always several option commands displayed at the bottom of the screen, such as: "TOPIC MENU", "HELP" and "NEXT". As such, you can never get really lost. Help is never any further away than the end of your finger.

Within a lesson there will be a combination of several types of presentations. Often you'll see a real human being walk out onto your screen and explain what's being taught. Text displays and diagrams will present bulk information. There may be animated video segments. Every so often you get a "recognition format" screen, which asks you a pertinent question just to see if you are fathoming the material.

If you want to skip out of the planned path, you can always jump to the menu. If you're in the midst of a lengthy live action

video segment, just touch any part of the screen and you drop into the *inquiry format*, equivalent to asking the instructor a question in a live lesson. The inquiry menu lets you bail out entirely, pause the screen image, replay a segment, get in depth help or continue on. The latest issue of the IVI system apparently also includes a fast forward mode.

This set up encompasses the best of live instruction and self learning from a book. As with a book, the IVI machine responds to your whims, allowing you to take things at your own pace, in the sequence that makes the most sense to you. On the other hand, the mixed live video, animation, text and question and answer presentation gives you all the stimulation of a live teacher. It's not easy to nod off in the back row while taking IVI 101...

An Apple for the Computer

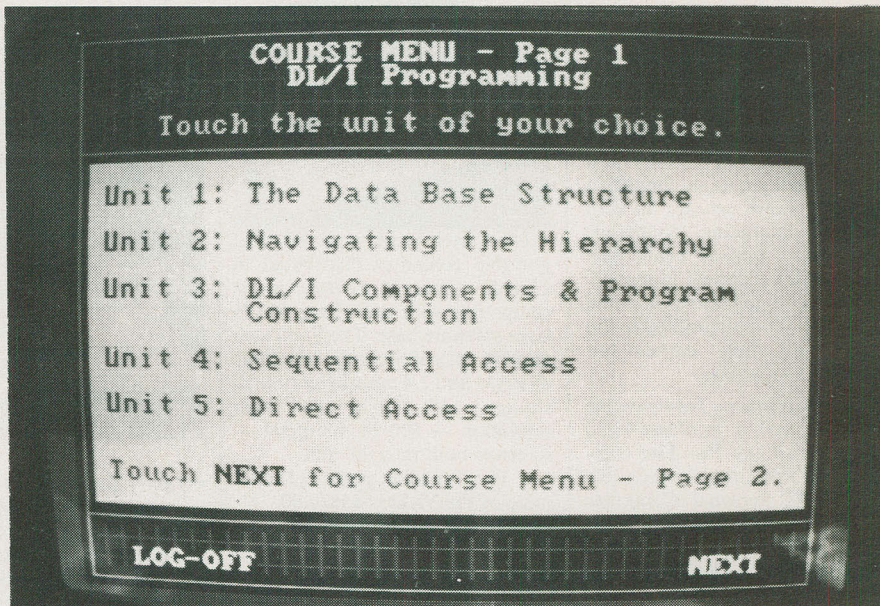
At the end of a lesson you take a lesson exercise to make sure you're ready to go on. At the end of a lesson module you're hit with a "mastery test". Scores are recorded on your student disk and can be displayed in a graphic format to assist you and the supervising instructor in gauging your progress.

Aside from being sort of entertaining, all this intelligent video might seem to be going the long way 'round as far as education is concerned. This is not so... and ASI has the figures to prove it.

According to the experts, a student uses up as much as a quarter to a half of his available mental energy in simply paying attention, having some sort of very low level mind to mind relationship with the teacher. Furthermore, the teacher almost always has to cater to a group of students, dividing his own attention and pacing the instruction to the least common denominator.

Contrast this with computer based teaching. The machine is totally individualized and demands nothing. Add a videodisk player and the system is capable of providing audio and visual information as well as mere blocks of data. The result of this union, according to proponents like ASI, is a means of feeding information into a receptive mind at the optimum rate.

ASI has a bunch of charts and graphs to support this line of reasoning. According to ASI, United States government studies have shown that IVI can reduce training time by as much as sixty percent over that of traditional methods. Equally important, when tested over a six month period the level of knowledge retained appears to stay forty percent higher. However, the cost of IVI is estimated at something like one fifth the cost of equivalent live instruction.



Lesson menu for the ASI course in DL/I

The ASI system will allow system users to customize their own package, or even construct whole new lessons.

Because the system generates its own feedback in the form of compiled student performance scores, ASI has been able to fine tune each module. If all students show a below average response on a particular lesson segment, for instance, this shows up glaringly in the scores. The problem segment can then be restructured or broken up into more digestible chunks.

The ASI system even includes the *Authority* authoring program. This will allow system users to customize their own package, or even construct whole new lessons. The limitation on this is, of course, the availability of a video studio.

Graduation

As used by ASI, the interactive video technique is intended for the solution to one specific type of problem, to wit, bulk, high speed upgrading of employees for fairly large companies. IVI offers some tempting advantages in these situations, low cost, flexibility, efficiency and verifiability. ASI actually boast of "90:90" performance, that is at least ninety percent of those taking the IVI

treatment will achieve a ninety percent level of competence.

Perhaps most important, students seem to enjoy the IVI approach. It really is a painless way to soak up dry information. The lesson modules have been designed on the expectation of forty minute study sessions. However, it is apparently not unusual to find students playing with the system for hours.

A simple audio visual aid can usually perk up a boring class, no matter what the subject. With IVI students can have a combination of virtually every kind of audio visual stimulation. On top of this, you spend your time working at a computer, which is after all the subject of most of the ASI courses. You can take things entirely at your own pace... go back... go forward... The ITS 2000 even has a built in headphone jack, so you study at your convenience rather than someone else's.

Finally, the thing is actually interactive. You can't doze off and just fool yourself into thinking you're learning something. The nasty machine'll fling a tough question at you, and you'd better have a ready answer.

Right now this equipment is intended for use by the big corporations... as Advanced Systems itself states, the Fortune 500 bunch. However, if IVI meets up to ASI's expectations we should be seeing a lot of this stuff in more mundane applications. There are plans underway to put all sorts of things on interactive videodisks, from videogames to encyclopedias.

Let's hope nobody thinks of building one of these things so it can assign homework.

CNI

COMPUTER PRESS

This Year's Models

COMPUTING NOW! — Now that the anxiety over an Orwellian 1984 is over, we can get on with some real computing. Numerous press releases for as many new computers have poured in our offices, so we're going to lighten the stack a bit. Not surprisingly, the majority of these entries are MS-DOS compatibles.

- **Texas Instruments Incorporated** has introduced a briefcase-sized micro entitled the **Pro-Lite** computer. The Pro-Lite is compatible with the TI Personal Computer and features 256K of RAM (expandable to 768K), an 8088 microprocessor, a 720K 5 1/4 inch disk drive, a printer port and an 80 by 25 line LCD display.

Available options to the computer include an expansion box which facilitates the addition of either a second disk drive or a battery pack, or both. A 300 baud modem and a 45 characters per second printer are also available.

The Canadian suggested list price of the Pro-Lite computer is \$4750.00.

Circle No. 37 on Reader Service Card.

- **Nelma Data Corporation** is shipping their Canadian-built **Persona 16** computer. Fully IBM PC software and hardware compatible, the Persona 16 comes standard with 128K of RAM, one 5 1/4 inch 360K drive, a parallel and a serial port, a clock/calendar with battery, eight expansion slots, and MS-DOS 2.1.

The Persona 16, manufactured in Ontario under license by AFTEK Business Machines, has a base retail price of \$2495.00.

Circle No. 39 on Reader Service Card.

- **Commodore's** latest entries into the microcomputer market are the **Commodore 16** and the **Commodore plus/4**. While the 16 replaces the VIC-20, the plus/4 is not intended to offset the Commodore 64, as it appeals to a different market spectrum.

The 16, as its title suggests, features 16K of RAM. The plus/4 has 64K of RAM and three integrated programs in ROM: a word processor, a spreadsheet with graphics and a filer.

We'll be having a closer look at these computers in the February issue of Computing Now!

Circle No. 41 on Reader Service Card.



- The **Victor Vicki**, a professional portable computer distributed in Canada through **Zenronics**, is compatible with the Victor 9000's large software base. The Vicki uses an 8086 microprocessor, has 256K of RAM and 2.4 megabytes of disk storage, and a nine inch high resolution — 800 by 400 pixel — screen is built into the unit.

The Canadian suggested retail price of the Vicki is \$5520.00.

Circle No. 42 on Reader Service Card.

- Another intriguing portable computer comes from Morrow and is being distributed here by **Micro Bazaar**. The **Pivot** is a MS-DOS compatible computer operating with a CMOS 80C86 microprocessor. The Pivot features 256K of RAM, a built-in four-function calculator, one parallel, one serial and one RJ11C port, a built-in 300 baud modem, a real-time clock with battery backup, two 360K 5 1/4 inch disk drives and a built-in 80 by 16 line LCD display screen.

Software supplied with the Pivot includes MS-DOS and the New Word word processor. A terminal program in ROM allows full use of the built-in modem, such as its auto-answer/auto-dial capabilities in either touch-tone or pulse modes.

The Pivot takes up a 13 inch square footprint when opened, and has a Canadian retail price of \$4340.00.

Circle No. 43 on Reader Service Card.



- **Tandy Electronics Limited** have introduced their **Tandy 1000** and **Tandy 1200** computers to Canada. The 1000 personal computer has — in its base configuration — 128K of RAM, one 360K slim-line drive, ports for a printer, monitor, joystick and lightpen, both MS-DOS and BASIC, and an integrated software package entitled **DeskMate**. The software incorporates a word processor, spreadsheet, filer, terminal and appointment scheduler on a single disk.

The higher-end model, the Tandy 1200 HD, is hardware and software compatible with the IBM PC/XT. The base system includes 256K of RAM, one 360K full-height drive and a built-in 5 1/4 inch ten megabyte hard drive.

The PC-compatible 1000 has a Canadian suggested retail price of \$1749.00. Options include either a colour or monochrome monitor. The 1200 HD model retails for \$4499.00 in its base configuration, though this price doesn't include either display adaptor, MS-DOS or BASIC, or monitor.

Circle No. 44 on Reader Service Card.

Next Month in Computing Now!

Computers for the Fun of It!

In the next issue of Computing Now! we'll be having a look at low end computers, those small plastic trolls that haunt prime time TV and subway ads. We'll be featuring a host of programming articles for these systems, plus a survey of what's about. With the current onslaught of personal plastic there's probably a lot more happening down there than you think. Some of it's pretty lively.

Commodore 16 and Plus 4 Reviews

That's right... you can have a peer at both of 'em. We'll be taking in depth looks at the two new systems from Commodore. The 16 features powerful graphics and many of the features found in the more expensive 64. However, it's black... a most vital consideration. The Plus 4 looks weird and has powerful integrated software.

IBM PC Utilities

Next month we'll be looking at writing utility programs for the PC. There are a lot of things that can be played with under MS-DOS... if you know where to put the code. All of the nasty undocumented things, like accessing the peripherals and reading the command line, will be properly scrutinized in glorious 8088 assembler.

Digging ADA

You've probably never even heard of ADA... the card, not the language. Well, plug it into your system... the card, not the language... and it will do some of the most interesting sonic things imaginable. ADA... the card, not the language... will make your fruit into a sound studio. If you buy one you may be able to program it in various dialects, like ADA... the language, not the card.

Computers At School

The educational applications for microcomputers are fascinating... and largely overlooked by most users who aren't directly involved with them. In the next edition of Computing Now! we'll be having a look into the classroom to check out what all that silicon is doing.

These features are in an advanced state of preparation. However, in endeavouring to keep Computing Now! as up to the minute as possible we reserve the right to change the contents of this issue prior to going to press.

Legal Computing

TORONTO, ONTARIO — Many of the laws that keep order presiding over utter chaos in Canada were written up in mediaeval England. As computers weren't then the going concern they are now across the Atlantic, archaic lawmakers overlooked such things as software piracy and mainframe 'hacking'. These omissions have left the law a bit vague on these and similar situations.

Computer Law, a publication of **Lauden Publishing Incorporated**, is written by lawyers and

accountants and keeps interested parties abreast of current legal developments as they reflect on the microcomputing industry.

Sample topics covered in the monthly report include data security and information crime, trade-secret protection, transborder data flow and liability for computer abuse.

Lauden Publishing Incorporated is at 34 King Street East, 12th Floor, Toronto, Ontario M5C 1E5.

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The Dark Halls of MS-DOS 2.0



A little while ago we acquired a whole seething stack of MS-DOS based systems... most of which wound up with staff members who had never even turned on a PC before. This engendered quite a number of questions about where the power switch really is and what goes on in the mysterious labyrinth of MS-DOS 2.0.

by Steve Rimmer

One of the fundamental differences between MS-DOS and earlier operating systems is that most of the tricks that people used to write little programs for under things like CP/M were built into MS-DOS by its designers. This isn't all that hard to understand... eight bit systems

have limited amounts of memory and, as such, relatively little room for operating systems with lots of bells and fugal horns built in.

MS-DOS, which generally finds itself running in at least a hundred and twenty-eight K, can usually manage to transcend these petty details. It has things in there you wouldn't have thought worth writing code for. There are handlers, drivers, filters, traps and tables for virtually anything one could possibly want to do... features which would make a pig shoot skeet, if in fact skeet were to be in season. MS-DOS 2.0 is one of the nicest places to work if you know where all the secret passageways are.

Ahem... yes, they are all still a bit secret, aren't they... the documentation for DOS 2.0 is not really any better than that of the original DOS. All the information's undoubtedly in there but, if you're like most users, you've never bothered to heave yourself bodily into the melee in order to

clutch the few useful bits from amidst the chaff.

This article will outline some of the most promising functions of MS-DOS for the non-technical user. We'll ignore the really freaky bits... they're just there to confuse most humans and make the bald guys in the lab coats with nothing to do but read manuals look slick when they use 'em. However, having a grip on even a few basic things will make your use of MS-DOS a lot smoother.

Fruit BATs

Let's begin with a few simple ones. It's often the case that one wants to create small text files under MS-DOS. You'll want to in order to use many of the tricks in this article. You can do this with WordStar, of course, but you can also use the MS-DOS built in editor.

You probably weren't aware of there being one of these. Listen, it wouldn't be a secret if they told everyone.

The MS-DOS editor is a combination of the line editor you use to enter text and the COPY function. It doesn't make a particularly flexible editor... don't plan to process words on it... but you can create short batch files and other disk flotsam using it without the hassle of booting a word processor.

You can create text files using COPY because COPY allows for the use of logical devices as well as disk files as its parameters. A logical device is a name with a colon after it. The logical device for your screen and keyboard is *con:*. To create a file called AUTOEXEC.BAT with the line GWBASIC FLATCAT in it you would type

**A>COPY CON: AUTOEXEC.BAT
GWBASIC FLATCAT**

and then hit control Z. This will end the file and write it to the disk.

Files of the type BAT are quite useful. If you make the BAT file we've just looked at and then type AUTOEXEC the command in the file will execute as if you'd typed it. If you had multiple lines in the BAT file the first would execute and, upon quitting it, the second, and so on, until the file was exhausted.

This is extremely powerful, as it keeps you from having to type a lot.

The file AUTOEXEC.BAT is a special case of the BAT files, as it will be executed automatically every time the system boots up if it exists. In the case of the one we've just looked at, every time your computer comes on line it will try to boot up GWBASIC and, from there, a BASIC program called FLATCAT... assuming both ex-

ist on the disk. If you actually created that file you might want to delete it. Try creating an AUTOEXEC.BAT file with this in it.

REM Have I been paid for yet?

and reboot your system. When it comes up again it won't ask for the time and the date... it'll just print out that line and show you the system prompt. This is a decent file to have... if you don't care about the system time.

It's often the case that one wishes to type a few lines one the system's printer without using a word processor... essentially just turning the computer into a very expensive dumb typewriter. For example, booting WordStar to address one envelope is not high tech at all. You can do this... it doesn't even take any programming. Just create a file called TYPEIT.BAT with the line

COPY CON: LPT1:

in it. You can execute TYPEIT by typing

A>TYPEIT

Actually, this isn't that dumb a typewriter. It will buffer your keystrokes, allowing you to edit what you've typed into it. When you have what you want to appear on the printer currently set up on the screen hit a control Z... or the f6 key... and return, and the contents of your typing buffer will be blasted out to the printer.

The line editing facilities of MS-DOS are a lot better than they look too. You can, of course, type a line... either at the system prompt or in a file like TYPEIT... and backspace over your mistakes. However, if you type a line with a mistake in it you can edit it and try again. To see the last line you typed hit f3.

Hit ESC and you'll be placed at the beginning of a blank line with your line invisible ahead of the cursor. You can see your line by moving the cursor forward with the right cursor key... the "6" on the numeric keypad.

You can add to the line by placing the cursor at the point where you want to insert text. Hit the *Ins* key and type away.

You can reuse and manipulate a line any number of times you need to like this.

Pipe Dreams

One of the neater facets of DOS 2.0 is that it pinched a few ideas from the creators of UNIX. UNIX is an operating system which was designed a long time ago for use on very large mini and mainframe computers. It's a very nice environment... after you convince yourself it wasn't created by Martians.

MS-DOS embodies some of the better things UNIX has to offer. One of these is its ability to handle I/O redirection. This sounds pretty horrible, and well it should. However, if you forget about this nasty word for a second you'll probably be turned on to what it can do for you.

It may also help to explain what some of those mysterious utilities you got with the MS-DOS disk are for.

Consider that most simple programs... not word processors and that stuff, but basic transient commands... have standard inputs and outputs. In many cases these are the keyboard and the screen respectively. A typical example of this is the program SORT.COM, which came on your master. If you run SORT and type in a list of words... one word to a line, followed by a control Z... SORT will print the words up on the screen in alphabetical order. It's a beautiful bit of programming, and absolutely pointless.

At least, it would be pointless if the keyboard and the screen were the only way to communicate with SORT. In fact, however, SORT is usually used as part of a pipe, or an indirection.

Heady stuff, this.

Indirection allows one to tell the computer to fiddle its internal bits such that whatever would normally come out of a program onto the screen, for example... that program's *standard output* will, instead, go to another program's *standard input*... probably making the second program think it is getting data from the keyboard. Moving data like this is called using a *pipe*.

This is a simple pipe.

A>DIR;SORT>A;SORTDIR

Now, as to what this little hieroglyphic means...

We've told the PC here that it is to perform a DIR command. However, it won't print the directory... it will pipe it. Actually, this isn't quite as mysterious as it seems. It will actually print the directory information to a file called %PIPE1.\$\$. This is a scratch file. Because the SORT command finds itself in a PIPE, it will take its input from the first PIPE scratch file and do its thing with whatever it finds... in this case, sorting it. Its output is being piped again, so it will write its sorted list to a second scratch file called %PIPE2.\$\$. This, in turn, by virtue of the indirection operator... the greater than sign... will be piped into a permanent file called SORTDIR on drive A..

PIPE scratch files can take up a lot of space, so they're deleted by MS-DOS at the end of a pipe. However, in this example they'll turn up listed if you type SORTDIR.

SORTDIR, should you not have guessed it by now, will be the disk directory sorted into alphabetical order.

Here's a pretty wild pipe

A>TYPE TEXTFILE;SORT>B;TEXTSORT

This one takes a standard text file and sorts it into alphabetical order, placing the now well ordered and completely unreadable file in TEXTSORT on drive B:

It's often the case that pipes and redirections get pretty involved. They can be put in BAT files to keep from having to type them over and over again.

Foot Paths and Root Rot

Paths are another lift from UNIX which turns up in MS-DOS. If you've gotten into the *Hacking of ZCPR2* article which appears elsewhere in this edition you'll have an idea what paths are up to. However, MS-DOS 2.0 has a different structure for that of CP/M, and, as such, its paths work a bit differently.

If you've been using the subdirectories of MS-DOS at all you'll already have encountered paths. A path is simply the route the computer takes, threading through subdirectories, to access the file you've called for. The simplest path is

A>DIR

This is a path with zero elements in it. It points to the current directory. If we had a subdirectory called BASEMENT we could create a path into it by saying

A>DIR\BASEMENT

and, if it, in turn, contained a subdirectory called CELLAR we could create a path to it.

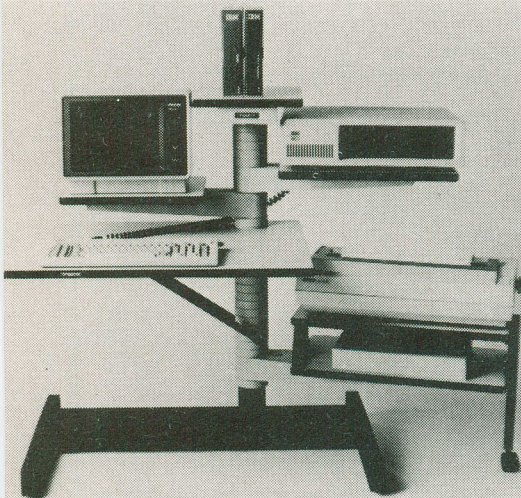
A>DIR\BASEMENT\CELLAR

To make this example more practical, let us drag from the dripping moss encrusted reaches of the PC a new command. Under CP/M, there is a common sorted directory program called D.COM. If one wants a disk directory listing one can type D. D is more useful than DIR. Under ZCPR, which supports permanent paths... we'll get to just what these do in a second... it's quite common to put D.COM somewhere on the disk and hereafter just hit D for a directory.

This is an annoying habit to take over to MS-DOS systems if you haven't got a D.COM program to use on them. As such, it's handy to create a file called D.BAT which contains the line

DIR %1 /W

The Dark Halls of MS-DOS 2.0



If you do a D or something like D *.BAS this thing will execute giving you a decent readable directory. The only hassle with this is that on a disk with a lot of subdirectories you'd have to have a copy of D.BAT in every one to use it.

There are better ways. The most elegant is to use the PATH command. Let's make things really slick and create a new directory called STUFF. This will contain all the programs and batch files which you might want to use from other directories. It could give a home to D.BAT, WordStar, SORT.COM... anything you're likely to want frequently.

Now, as soon as the system boots issue the command PATH A:STUFF. This will create a permanent search path into the STUFF directory. In other words, no matter where you are in the subdirectories, you will be able to access the programs in the STUFF directory as if they were in your current directory. To look at this another way, you've given MS-DOS a place to look for programs it can't find elsewhere.

Paths can be longer than a single directory. You can give MS-DOS a whole series of places to look for commands.

If you are going to make the STUFF directory a permanent part of your system disk, you can eliminate the need to issue the PATH command each time you boot the system. Create an AUTOEXEC.BAT file which contains the command and it will happen every time you turn on the computer.

Translator, Please

As a final venture into the catacombs let's get into some heavy character translation. It's often the case that you'll want to make the characters on the keyboard do things

other than that which they are supposed to be doing. While the mechanism of this is extremely weird and involved, the process of setting it up is not much harder than what we've been looking at up 'til now.

There are a number of ways of effecting character translation... most of them requiring nasty machine language programming. You can, however, get it together fairly simply if you don't mind losing about two K of RAM.

Your MS-DOS disk will have on it a file called ANSI.SYS. This is called a *device driver*. Let's leave exactly what that is to another day. However, if you invoke it properly you can let it do character translations for you.

Create the following file

```
A>COPY CON:CONFIG.SYS
DEVICE = ANSI.SYS
```

and reboot your system. The CONFIG.SYS file is a bit like AUTOEXEC.BAT, in that the system looks for it on startup. However, it is exclusively for the use of device drivers, like ANSI.SYS. If you have some sort of specialized peripheral card that entails the use of a device driver as well you will have to create a CONFIG.SYS file with both assignments in it.

Now, enter BASIC and type in the following short program. SAVE it, then RUN it.

```
10 INSTANT KEYBOARD RE-ASSIGN-
MENT PROGRAM
20 'NO GLORY, NO WAITING
30 ESC$ = CHR$(8) + "I"
40 OPEN "O", #1, "A:KEYFIX"
50 PRINT #1, ESC$ "0:83:8p"
60 PRINT #1, ESC$ "94:42p"
70 CLOSE
80 END
100 AS = INPUT$(1): IF LEN (AS) = 2
THEN PRINT "0:" ASC(RIGHT$(AS,1))
ELSE PRINT ASC(AS)
```

Having exited to MS-DOS... the command is SYSTEM... you will have a file called KEYFIX on your disk. If you type KEYFIX you will see a couple of blank lines but, like imitation slight of hand on a cheap late movie, the caret key, shifted "6", will produce asterisks and the delete key will work as a backspace.

There are number of things happening here. The important bit is the creation what is called an *escape sequence*. In this case, the system will regard the string "ESC I" as a signal that it's about to get a character redefinition. The next bit should be the number, in decimal, of the key to be redefined. Next comes a semicolon and the number of the key it's to be transmuted into. Finally there's a lower case "p" for reasons that aren't made abundantly clear.

You can't type an escape character on the console and have it show up as such because the operating system traps it. Thus, we must find some other way of getting it there. While one could write a machine language program to do it, creating a text file with the appropriate strings in it and typing the text file is a great deal easier. In addition, it leaves up with a file to type, so the redefinition needn't be entered by hand in the future.

Some keys do not have single codes, but, rather, return two byte strings, of which the first byte is zero. This is the case in line 50 of the above program, wherein we are redefining the delete key. It returns the bytes 00 and 83 decimal.

If you want to add some more definitions to this program... you can change or remove the one that turns the carets into asterisks without hurting my feelings... you will find that running the program at line 100 will be handy... it will accept a keypress and print out the number of the key to be used in a redefinition string.

Once again, you can make the process of redefining the keys of your system automatic by including the line

TYPE KEYFIX

in your AUTOEXEC.BAT file.

Spectres

There are, of course, manifest other passages and crawlspaces in MS-DOS... this has been but a sampling. One could fill a book with all the weird stuff that's built in there... and several publishers have.

Many of the facilities of this powerful operating system are, to be sure, a bit esoteric. The stuff we've been looking at here, however, can really make the whole works a lot more pleasant to handle. All of these bits are, in fact, the result of genuine questions from authentic humans.

Next time around perhaps we can get a bit deeper into things. We might look at having the *PrtSc* key play a choice of tunes through the system's speaker... it can actually be done. Perhaps even more profound is the system's capacity for producing an assortment of limericks instead of error messages. All it takes are the appropriate commands.

The original Apple *Lisa* was unique in that it could power itself down under software. Future PCs might well have the same facility in an effort to be state of the art and technologically more trendy. Imagine that... consider the karmic reality of

```
A>COPY CON:AUTOEXEC.BAT
SWITCH OFF
```

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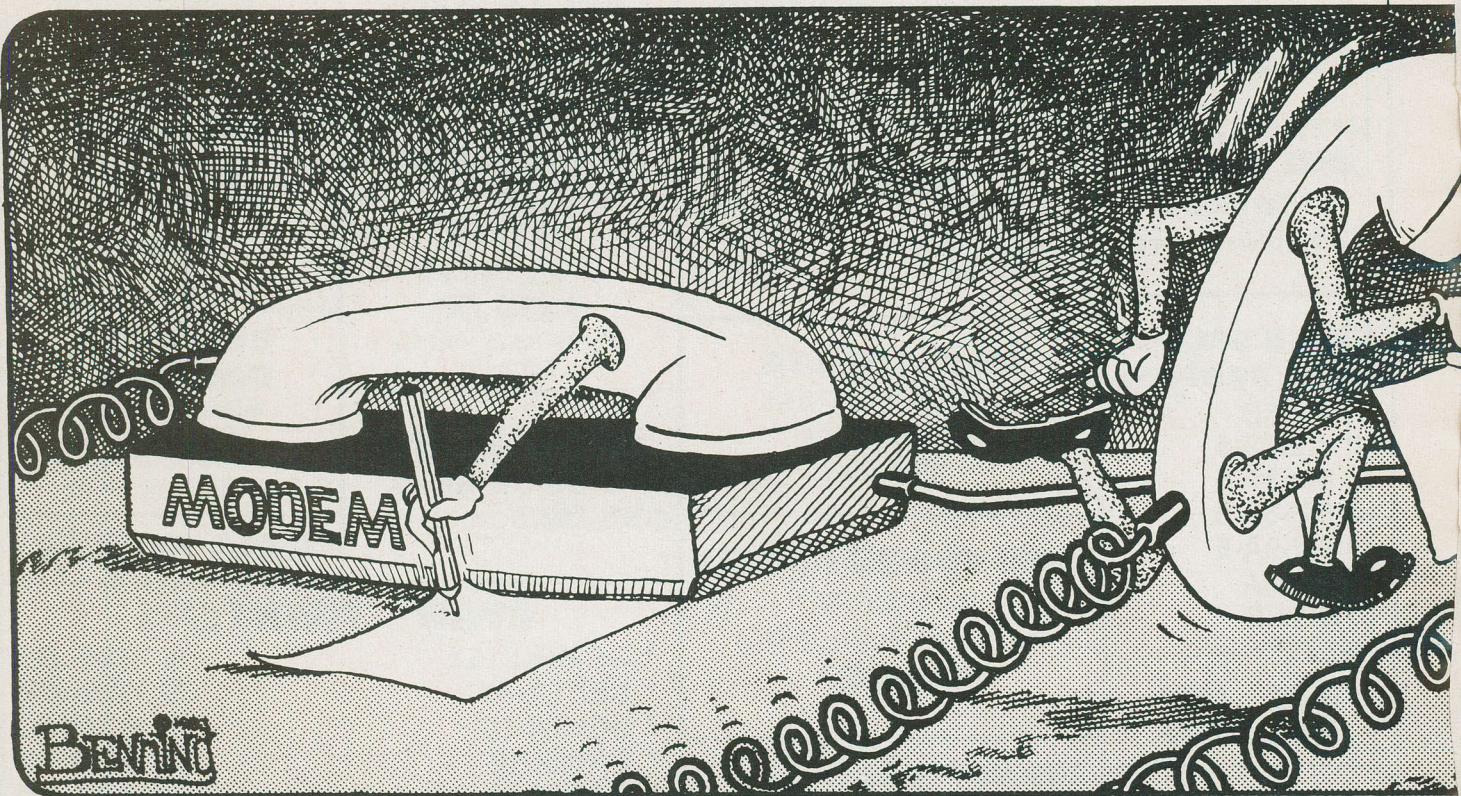
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Phone Busts



Telecommunications is a nebulous area in the eyes of the law... and the feeling is mutual. Many users, legitimate and otherwise, are unclear as to where they stand with regard to the powers that be. Here's a look at the current street level legal situation.

by Frank Lenk

There was a case last fall in the States of a criminal who had apparently spent months using the various long distance telephone networks... AT&T, Sprint, etc... for free. He had been collecting and swapping credit card numbers, ordering thousands of dollars worth of goods by phone and having them delivered to unoccupied model homes in his neighborhood. When his premises were raided... through a combined effort of the FBI and the local police... something around twenty thousand dollars worth of pirated software was also found.

This hardened criminal was in fact a thirteen year old kid with a Commodore 64.

He claimed he'd only done it for the challenge.

We've all heard of these near legendary heroes of the computer age, the hackers, who have learned to use the machinery of society against itself. There's an inescapable romance about the idea.

Unfortunately for a lot of these would be Robin Hoods, the machinery of society has a way of protecting itself. The past few years have been a sort of a magical golden age for computer hacking. Alas, for the romantics among us, these golden days are nearing an end. Security measures are being tightened to make hacking impossible, and legal loopholes are being slammed shut... in some cases directly upon the outstretched necks of those who had counted too much upon the sense of humor of the guardians of social order.

Much of this change has gone unnoticed. However, a few rumblings have come down the grapevine. There have been persistent rumors of people getting themselves into no end of trouble on account of playing fast and loose with the telecommunications facilities.

Since most of what has been "reported" has, in fact, started out as whispered heresay passed on the night... or left on bulletin boards by anonymous callers... this

article will look at what is really happening in this area.

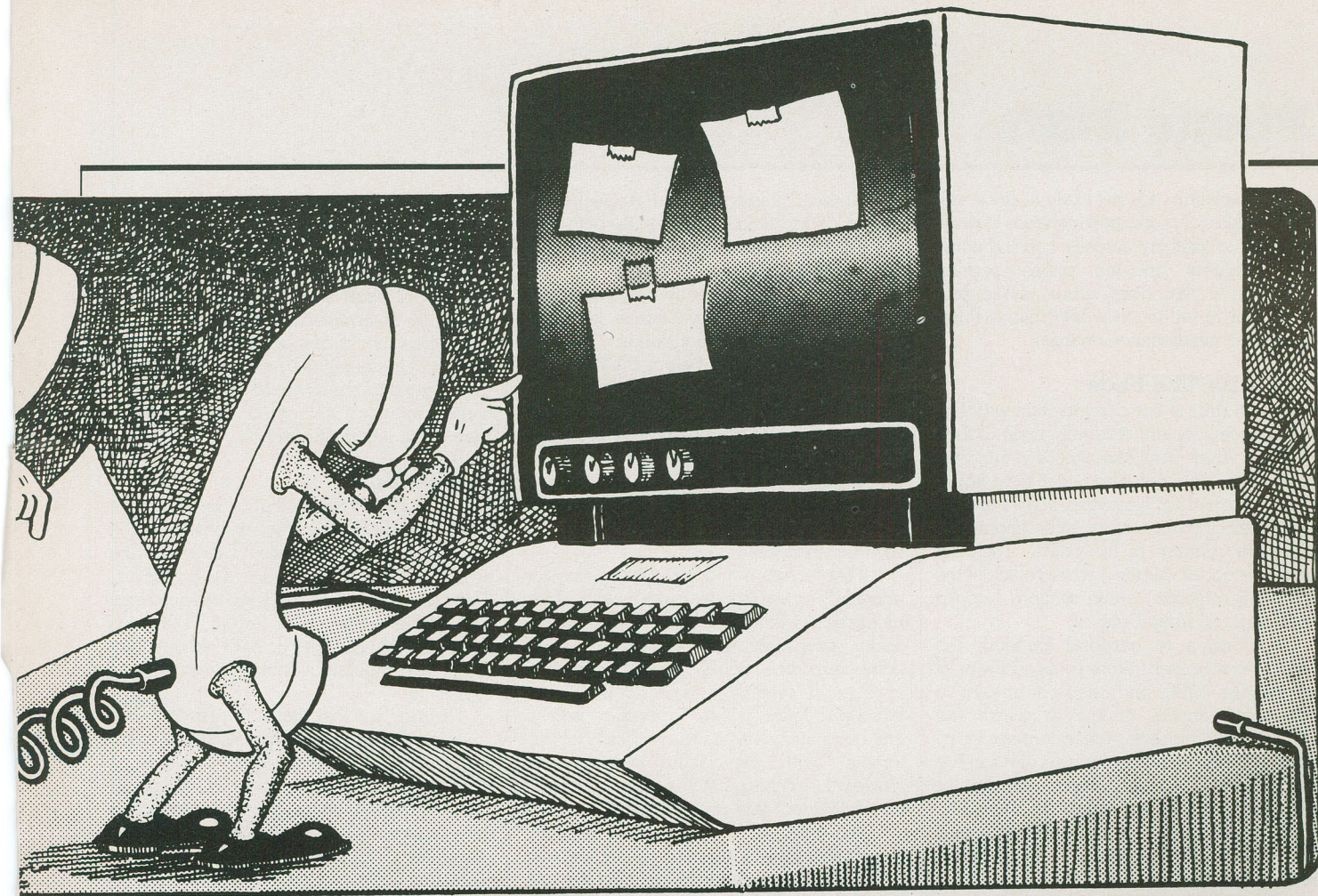
Ma Sends Her Best

Chances are you are not really a hard core hacker. Perhaps some of your modem activities have at times... ahem... slightly crossed the line into the realm of tabu. You might think that your first sign of trouble would be in the form of a massive assault by the minions of Ma Bell. This is not so. Jim McPeak, a spokesman for Bell informed me that Bell's interest is limited entirely to business matters. If you're paying your bills, Ma Bell smiles upon you... regardless of your morals or grooming habits.

There are really only two ways your computer can get you in trouble with the phone company. The more serious of these involves making use of the infamous "blue box"... or any reasonable facsimile thereof.

For the benefit of the uninitiated we should explain that "blue box" is the hip term for a device that enables one to make long distance phone calls without incurring long distance charges. You can see how this might tend to inflame the folks at the phone company.

There are two more or less traditional methods of ripping off long distance service. The simplest in principle is the use of



some appropriate device to imitate the sounds emitted by a pay phone when one pours change into it, thereby convincing the operator that coinage has been deposited. It turns out that some of the more sophisticated microcomputer sound generators... like that of the Commodore 64, for instance... are far too well suited to this nefarious task.

The more official type of blue box is a bit harder to organize, and involves getting a call past the Bell billing computer entirely. Generally the device works at the receiving end, emitting a signal that prevents an incoming call from registering as it should. From then on, the call ceases to exist as far as record keeping is concerned.

Although it needs a bit of technical expertise to cook up this kind of device, it seems that a home computer can be one of the major ingredients. The drawback is that the perpetrator is fixed to a particular location. If it all works according to theory, fine. However, the telephone people have all sorts of technology of their own, and you can never be sure that you aren't drawing attention to yourself at some new switching center, maybe half a continent away.

Aside from such actual theft of services, there is one other thing that can cause Ma Bell to get peeved. This involves the distinc-

tion between private and business service. The difference is simple enough... the higher business rate applies to any phone used in connection with making money. Personal rates are for everyone else. You are expected to apply for a business rate if you run a business from your phone.

This has some implications for telecommunications users. Let's say that you are the system operator of a small private bulletin board service. You decide you want to add some more disk space to the system, so you levy a small user fee... say five bucks per member. Folks start sending in their cheques, and you now owe Bell for a business line.

There have been some rumors about boards having hassles as a result of their heavy use of the phone lines. These rumors are wholly spurious, according to McPeak. Although the company has been pressing for metered service, nothing like that exists as yet. Unless you're actually defaulting on the existing phone rates you're in the clear. Bell has no legal right to complain about how or how much your phone is used.

However, don't take that situation too much for granted. Bell is still wheedling the government for metered pay as you go service. If they get it, BBS owners could be in for some heavy bills.

Although Bell has no legal argument against auto dialers, in some areas it is starting to come down on use of what they call "automatic dialing and addressing devices". These are essentially tape decks with fairly dense little computers built in. They call all the phone numbers in a selected range and deliver a canned advertising message.

The trouble is that these units are not smart enough to stifle themselves if the wily consumer decides to hang up before the message is through. This leads to the fear of exchanges being unnecessarily tied up. The solution will likely be to insist on some degree of human supervision for the machine, to keep exchange usage to a minimum.

Actually, the only time exchange use gets too heavy to handle right now is during radio station phone in contests. For instance, about two years ago a station outside of Toronto offered to give away a year's worth of mortgage payments. The response was such as to crash the local phone exchange and some of the long distance network as well.

There is a final note about hardware. All equipment connected to Canadian phone lines must bear Department of Communications approval. American FCC approval is not an acceptable substitute. Of

Phone Busts

course, violations are not likely to draw any flak... unless your creation manages to draw attention to itself by actually causing some unpleasantness on the phone system. However, if that does occur you're probably not in for much worse than a forty-one dollar maintenance charge.

Fun with The Feds

The main drift of our conversation with Bell was that call content is literally none of their business. They don't care what's in the calls, so long as they get paid what they figure they're entitled to. However, if laws are actually being broken, the matter might well draw the scrutiny of the police. Thus my next port of call was the Toronto office of the RCMP commercial crime section. I spoke with corporal Jerry Dendoff.

According to corporal Dendoff, the need for computer training was recognized as early as 1980, and has been met by a one week annual course in which the RCMP, OPP and local police forces all participate. This orientation course clues in the participants as to the deeper meaning of obscure acronyms like FORTRAN, COBOL, and so on. It also gets into where and how to find evidence of computer related crimes.

The RCMP, in keeping with its role as a national police force, clamps down only on cases which cut across national or provincial borders. Up to now, this has involved them only in the more spectacular hacking cases.

One of the earliest Canadian cases was that of Regina versus McLaughlin, in 1978. This involved three University of Alberta students who crashed the school computer system. The official charges were theft of telecommunications service and mischief. We'll discuss the meaning of these terms in a moment.

Also in 1978, there was the celebrated case of the Dalton Boys School. A number of students at this private Manhattan school went marauding around various computer systems, including one at Canada Cement in Montreal. Files were destroyed and blood pressures elevated before tracing the phone calls led to a surprise raid on the Dalton school and the discovery of a pre-teenager busily hacking away.

Although the miscreant's age shielded him from really serious repercussions, the case helped draw public attention to the hacking situation.

The incident of Regina versus Stewart, though not actually a case of hacking, was important in establishing a Canadian legal precedent. The case concerned theft of a hotel's computerized personnel records. In

1983, the Ontario Court of Appeal found that copying of this confidential data constituted theft, even though the original data was not damaged.

The case is apparently being appealed to the Supreme Court of Canada, but in the mean time the precedent stands.

Another case still before the courts involved the deliberate destruction of a company's records on a US computer by a competitor in Toronto. The defense held that the lost data could not be considered to be property. The prosecution was attempting to counterattack by claiming the physical value of the computer tapes on which the data had resided.

These cases... and others involving the university crowd or even kids with Commodores... would yield much more easily under proposed new legislation against computer crime. Bill C 19 apparently tried to expand statutes to specifically punish those who "alter, destroy or render useless" any computer data, or who "obstruct or interfere" with the lawful use thereof. However, existing statutes offer two good routes to successful prosecution.

The charge of "theft of a telecommunication service" applies to anyone who uses false access codes to log onto services like Datapac. This kind of access results in the genuine code user being charged for the access time. The same thing pertains to use of credit purloined credit card numbers on the long distance network. Whatever the legitimate user is undeservedly charged for is what the hacker has stolen.

This type of offence is classed along with other types of theft. For a theft of under two hundred dollars the maximum penalty is two years behind bars, a fine or both. If the amount goes over this figure, the penalty can run up to ten years in the big house.

Unauthorized use of an access code could also incur a charge of impersonation, though that one hasn't been tried out yet. The maximum sentence would be up to fourteen years in the clink.

The most common charge so far has been that of mischief... the same charge that applies to acts of physical vandalism. Damage to private property up to fifty dollars is covered by summary conviction, which carries penalties up to about two months in jail, restitution, fines or a combination of all three. Over fifty dollars the penalty can go up to five years in jail. For public property damage over fifty dollars the penalty for computer hooliganism could be as much as fourteen years or hard time.

The pertinent question... especially for the wayward hacker... is really how likely one is to get caught. In fact, the likelihood is

increasing. Identification procedures are being tightened. Some systems keep the caller off for a set period of a pre-set number of failed logon attempts. However, this sort of effort can still be countered by the really determined hacker.

Often the system will insist on calling back... at the genuine user's phone number. This prevents anyone else from using the same password, though it may inconvenience the legitimate user.

Racket Ball

More locally, I learned that computer crime is handled by the anti-rackets branch of the Ontario Provincial Police. These are the same folks that go after fraud, counterfeiting, credit card and cheque rings and other white collar crime. Detective Sergeant Jim Hickling told us where they stood on modems, hacking and similar topics.

It turns out that the OPP presently has three active investigations relating to computer communications. For obvious reasons Hickling couldn't be too specific, but he did mention that one of the cases concerned an individual who had penetrated at least two computer systems, bypassing security measures in the process. Another related to employees who had spent their off hours playing around with the company system.

These people are in for a nasty surprise. At least one recent case was dealt with by a visit to the offender's home, some verbal advice to the offender... and some further advice to the offender's parents.

The OPP also has several serious non-hacker computer crime investigations ongoing. One Donald Orr was actually charged this summer after having sabotaged his employers' computer system by planting timed software "logic bombs".

On the subject of deliberate, malicious acts of hacking, Hickling was quite definite. These cases are "fairly easy to trace", similar to repetitive cases of obscene phone calls. The trouble is that the hackers "don't have to confront the victim", acting as they do "in the comfort of their own home". This brings on sense of security that is quite misleading.

Companies have in the past been somewhat reluctant to take action against hackers, balancing the nuisance value of extended court actions against the annoyance of the hacking itself. Now, however, as publicity has increased the willingness to be bothered with prosecutions has also increased.

Furthermore, the OPP now has both the personnel and the facilities to deal with hackers. There are presently four computer literate investigators in the anti-rackets

squad, ready and eager to crack down. The exact extent of the OPP coverage can't be discussed, but Hickling stated that they "do have the facilities and the personnel... to keep a check". Notice is being served that abuses are "going to have to be stopped". Hickling himself is hoping for "more awareness on the part of the younger crowd."

On the other hand, we also inquired about the position of the well meaning SYSOP who may be finding messages on his board dealing with hacking matters. In these situations, the outlook appears to be much more relaxed.

This does not mean that an operator cannot be legally liable for the messages posted on his system. Anyone who "aids and abets" or fails to take reasonable action to prevent a crime can be taken to task under the law. However, the fact that charges could theoretically be made does not mean that they would have a chance of standing up in court. The intent to have committed a crime would have to be demonstrated, for one thing.

In practise the chance of being charged would depend on the severity and persistence of the offense. Hickling used the example of speeding cars. If you're going with the flow... even if that flow is travelling at a hundred and twenty kilometers an hour... you would probably be safe in assuming that the police can't say "everybody from here to Niagara Falls, pull over!" On the other hand, if you manage to become conspicuous... you're on your own. And, regardless of the severity of the offense, the police must act on any specific complaints from the public.

The use of BBS's to transmit information relating to software piracy is an even more nebulous area in the eyes of the law. Again the question of intent becomes important. Furthermore, it would probably have to be demonstrated that the victim of any piracy was actually harmed or at least "put at risk" of economic harm.

The comforting fact is that the OPP, at least, is not aware of any cases in Ontario of BBS operators being caught up in hacking charges.

Blues

This does not mean that we should all relax. The various police forces are getting serious about hacking. "I would say it's very serious," Hickling stated. "The potential for damage and destruction puts a company at serious detriment." In the case of an American cancer clinic whose records were broken into, the audit required to ensure the accuracy of the files ran to several hundred thousand dollars... even though it was claimed by the hackers that no changes had been made. If the audit had not been made, or if a change had somehow slipped through, the result could have been a loss of human lives.

As Jim Hickling says, "It's not a joke." **CNI**

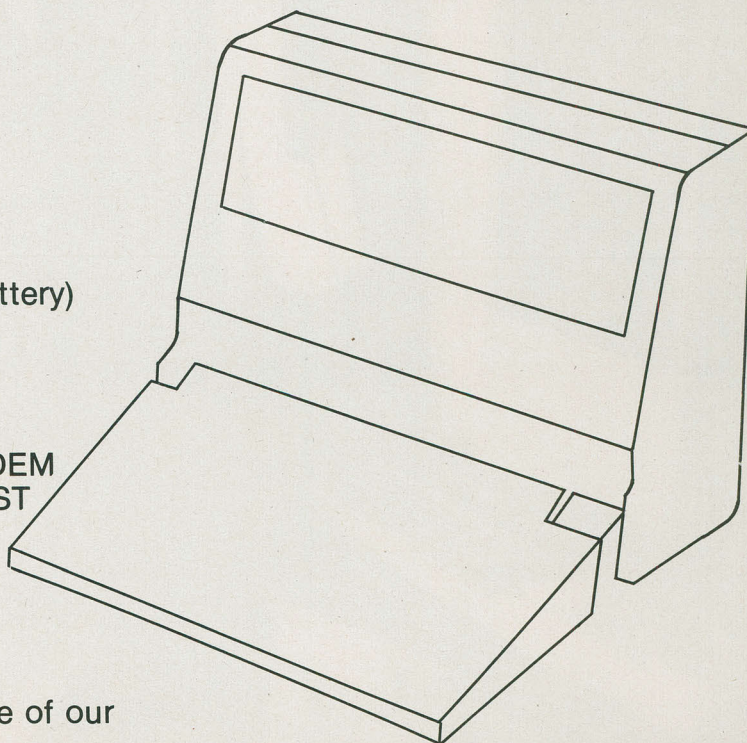
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Making That Modem Dance



Modems are usually the first toys one looks at and the last one gets to understand. This is cool... they're weird and mysterious and they have little fanged fuzzy dudes inside that'll bite your data clear off. Here's a look at how to mellow them out and get them to party.

by Steve Rimmer

Modems have the distinction of being among the cheapest peripherals... and the least easy to implement. There's probably some sort of physical law which explains this situation very plainly. However, as it is, most computer users acquire a modem sooner or later.

Making a modem work is rather more involved than simply finding the cash to pay for it, and making it really leap up on the table and dance its little heart out for you is quite the exercise in persuasion in many cases. However, dancing modems aren't as rare as you'd think and, with a bit of work yours can tap, waltz, boogie and do the three hundred baud shuffle like it was born to it.

A bit of insight into the workings of these complex little boxes will also help you to keep the thing from getting into that other discipline of footwork, break dancing... which is followed by the warranty tango.

This feature will look at the basic moves and steps involved in getting a modem happening on your system.

Alleman' Left

All modems do basically the same thing. They take serial computer pulses and convert them into a series of audio beeps. Audio beeps can make it over the phone line. Computer pulses cannot. Further to this, a modem, upon receiving the correct beeps, such as from another modem, can reconstruct the computer pulses that begat them. As such, two computers can exchange information through modems with a phone line in the middle.

There are actually other kinds of modems which use other media for transmitting stuff over. However, these tend to be the province of mini and mainframe computers, so we'll ignore them for the purposes of this feature.

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Making That Modem Dance



A typical direct connect "smart" modem.

concept. The widgets are actually quite important... a raw modem isn't terribly useful in a real world situation.

The simplest sort of modem is an acoustically coupled modem. This is a box with two rubber cups on top to accept the receiver of a phone. When you want to communicate with another computer you simply turn on the modem and jam in the receiver. It works about as well as you'd think, being susceptible to room noise, old phones and burping cats near by. It's also a bit of a party if you have a contempora phone.

Direct connect modems are a much better scene. They plug directly into the phone line through RJ11 connectors. The more civilized ones have additional RJ11 jacks to allow you to plug your now orphaned phone into them.

Fancy direct connect modems not only allow you to telecommunicate... you can also use them to dial the number you want to beep at. We'll get to the higher planes of being involved in this momentarily.

Direct connect modems are typically found in two styles. The usual manifestation is as a small flat box with some technical looking stuff out back and a few LEDs to tell you what's going on inside up front. The more primitive ones have switches for things like turning on the carrier... how barbaric.

Many modems don't have boxes, however, as they plug directly into the computer they're designed for. This is only really practical on systems which have peripheral slots of some sort... the IBM PCs and Apples, for example, have a host of plug in card modems available for them.

Finally, we should have a quick look at baud rates. Modems tend to come in two speeds. Slow speed modems, which are relatively inexpensive, run at three hundred baud. This corresponds to thirty characters per second, or a bit slower than most people comfortably read. Fast modems, which clip along at twelve hundred baud, are a lot nicer... but they cost quite a bit.

The Hookup

In buying a modem one is generally initially confronted with wondering what to do with the thing after it has been uncrated. This varies with what the thing actually is and what it's going to be doing. Some modem applications are pretty straight up... and some are ordeals.

The simplest thing you can do with your modem is to use it to communicate with a remote system on a dumb terminal basis. This requires that you have a number of things, both in hardware and software, happening properly at the same time.

To begin with, you will need a computer, a modem, a serial port for the computer if the designers of said computer didn't see fit to include one in it, a serial interface cable and some terminal software. Some of this may already make sense, but we'll go over the whole bucket to mow down any remaining ambiguities.

Your computer is capable of doing some really sophisticated things... acting as a terminal isn't one of them. A dumb terminal program typically occupies fewer than two hundred bytes of code, making it one of the simplest things that one can get together. Now, in many cases terminals must be written in machine language... you have to pick the *right* two hundred bytes.

However, being a dumb terminal is pretty simple.

Most dealers worth talking to will be able to provide you with suitable communications software. There are commercial packages available for most systems... these invariably do more than just act as terminals... but most decent computer dealers will have straight up terminal software kicking around somewhere. Some operating systems come with terminals all ready to go.

The other software thing you'll want to get into is the setting of the protocol. This is tricky in that it varies so greatly from system to system.

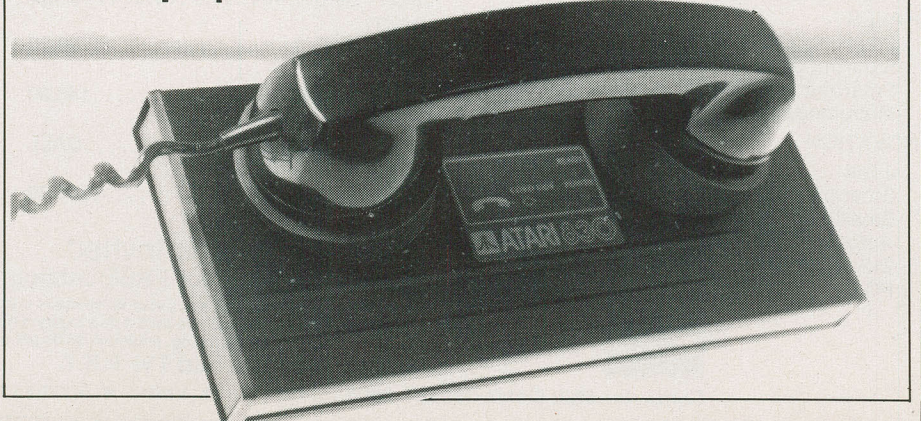
In order to communicate with another system both computers must agree on the format they'll be using to send data. This involves the speed, that is, the baud rate, the number of bits in a character, the number of *stop* bits and the setting of the *parity*. Don't worry about what these freaky italicized munchkins mean... the important thing is that the two computers have them set up the same way.

It is also important that the protocols of the computers match the speed of the modems. For example, setting up the computer to talk at twelve hundred baud and plugging it into a three hundred baud modem will probably produce confetti on your tube.

On simple or older style serial ports the protocol is often set in hardware, using DIP switches or other physical grotesqueness. This is rarely seen anymore... it's usually handled by stuffing a few bytes into the appropriate registers.

CP/M based systems usually come with a program called CONFIG or SETUP which allows one to define the initial baud rate and protocol for the ports. This works by changing the values which are used to initialize the ports when the system first comes on. However, all serial ports are initialized differently. As such, it is essential

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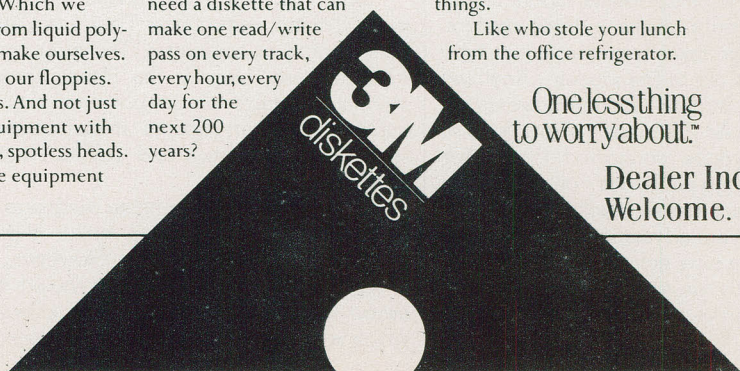
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Making That Modem Dance

that the designer of the system have known in advance what sort of serial port hardware the system would be looking at.

This is cool for something like a TRS-80, wherein all the hardware is completely defined and inflexible. It isn't quite as cool for, say, an Apple, which allows the user to plug in any of a number of serial port cards, each having a totally unique procedure for setting the baud rate.

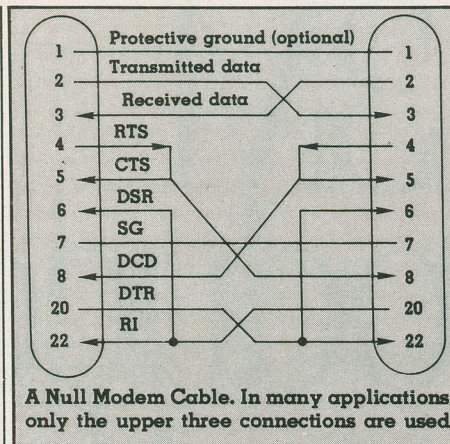
Apples don't come with CONFIG programs to set the baud rates of whatever serial ports might be added to them, although some serial port cards for the Apple do have such support software. This is also somewhat true for the IBM PC, although the serial port hardware is very much more standardized in blue beasts.

How ever you get the serial port happening on your computer, you'll want it set up for three hundred baud, seven bit characters, even parity and no stops. This is the standard protocol for low speed telecommunications... virtually every on line system in creation can make sense of this.

The next trip is to plug your modem into your computer. The standard connector used for telecommunications systems is the RS-232C interface. This is a twenty-five pin trapezoidal connector of which all but three of the pins aren't particularly important. The three exemptions are pins two and three which carry the data, as pin seven, which is ground. A few more pins can be used when you are running at higher baud rates, when you are trying to do something more sophisticated than just run a dumb terminal or if you want to control certain kinds of modems.

In most cases, the control one has over a modem is fairly limited.

Finally, boot your terminal software. You will want to be in terminal mode... some things give you a choice in these matters. Terminal mode takes everything you type and heaves it out to the modem. Anything coming back from the modem goes up on your screen. As such, each character you type when you're connected to another system has to go all the way out and come all the way back before it will echo on your screen. There are advantages to this, as opposed to using local echo. If a character appears correctly on your tube you can be reasonably sure it has made the journey uncorrupted.



The best way to test your system is to call a bulletin board. There was a list of all the active numbers in Canada in the last edition of Computing Now!. If your modem gives you a choice, switch it to originate mode and call a board. When you get an answering tone from the remote system turn on the carrier at your modem and hit a few carriage returns.

Protocols

There are a number of rituals to be observed with modems. Much of it is fairly arbitrary, but it is in trying to understand all these freaky bits that most users eventually consider getting back into building lutes.

One of the fairly important things to understand, especially as sophisticated modems become more accessible, is the meaning of a *smart* modem. These things were largely originated by DC Hayes a few years ago, and consist of fairly ignorant looking boxes with modems and small dedicated computers inside.

In most cases, the control one has over a modem is fairly limited. More to the point, if one does not have a serial port with the proper features... and few port designs support them... one has no software control to speak of over a straight up dumb modem.

Smart modems allow the local terminal to send them instructions. They have little built in modem languages. The most common of these things is the Hayes *Smart-modem*. In fact, it's so common that a number of other modem manufacturers, such as US Robotics and Anchor, have adopted it.

The Hayes smart modem language is actually pretty simple and better things could probably be arranged. However, in choosing a smart modem one should be aware that most of the terminal software which is available to drive smart modems is

designed for use with Hayes compatible boxes. As such, it's not much use on modems which use their own unique type of smarts.

A smart modem will initially behave like a dumb modem. However, its computer will watch the line looking for a command sequence. The command sequence is a one second wait, three plus signs and another one second wait.

If it gets this sequence it will know to interpret the next group of characters as instructions to itself rather than simply as data to be thundered out into the great unknown. For example

+++ATZ

tells the modem to hang up and reset its parameters.

The repertoire of commands for a smart modem is pretty rich. If you tell it

+++ATDP423-5149

it will pick up the phone and dial the Bull. ATDP is pulse dialing, while ATDT produces touch tones.

The modem can also return information about itself in similar codes, informing its user that it has received a carrier, that it is off line, and so on. Various permutations of smart modems have internal diagnostics to check themselves out... the results of which can also show up in this way.

The ability of the modem to dial and to signal the host computer regarding what the phone line is doing is actually a lot more important than it seems, as it allows the system to *auto loop*, or dial the same system over and over again until it gets through. This is almost essential when one is trying to elbow one's way onto a crowded bulletin board.

Transfer, Please

Another one of these mysterious protocols is the Christiansen transfer protocol, or MODEM7/XMODEM. This isn't a smart modem code, and it has nothing much to do with baud rates. However, you'll hear a lot about it... especially in this issue, where it comes up in several places.

If you send a character down the line there is a reasonable chance that mother Bell will choke on it and send it back partially digested. The corruption of a few bytes of data in text is a bit messy, but usually recoverable. A few lost bytes in a program source file or, worse still, an object code program, will usually render said files largely useless.

Sending software or text files from one system to another by modem is a very powerful facility. However, simply stuffing

Almost Free PC Software Volume II

It must have been the roses



A good program is like a good politician . . . no, wait, we've succeeded in finding some good programs. However, it did take a lot of searching. Presented here is a selection of some of the best utilities, games, programmers' tools and business applications ever to order the bytes on a disk.

Sweep is a turbocharged Ferrarri of a disk utility which makes the COPY command look like a goat herd by comparison. It allows one to do mass copying, deletion, renaming and other disk functions all in menu driven comfort. It supports essentially the same command structure and behavior as the CP/M Sweep and Disk programs.

Worldmap is a sophisticated graphics program which draws a very detailed picture of the planet we live on and daily endeavour to blow up. It will display its wares on the tube or send them out to a printer.

Anitra plays Anitra's Dance by Edvard Grieg. PC music programs are a gas . . . everyone should have a disk full of them.

Ramdisk is among the most useful of all the utilities you'll ever plug into your PC. It creates a virtual drive on your system out of memory. You can pop your files over to it when you boot the beast and thereafter experience disk accesses that take less time to complete than real drives take to turn on their LEDs.

Alien plays a bizarre adventure game. It leads you into some pretty warped places. It comes with a massive data file for an adventure that you won't get tired of 'til the dragons come home for the evening.

FOS is a personal financial manager which will, among other things, make your cheque books into servants of humanity as opposed to denizens of the aforementioned adventure game. It's thunderously slick.

Jukebox represents yet another PC music system. This one comes with a host of songs to play and some really electric graphics.

Asmgcn is one of the best text disassemblers we've come across. It takes any executable COM or EXE file and produces an assembler listing. It's surprisingly good at distinguishing between code and imbedded data or text. If you have need to patch or modify code this thing will outdo DEBUG by light years.

Struct will appeal to the rabid programmer in everyone. It allows MASM to be used to assemble a sort of higher level language. Included also is a test file to illustrate the syntax.

Prtsc replaces the internal PC screen dump code with something more suited to reality. It allows one to hit the PrtSc* key and then select what the screen dump will look like from a menu. It supports a number of popular printers.

Breakout plays a PC version of the popular game. It will accept input from either a joystick or the keyboard. The graphics are good and the action is adjustable from a beginner's level right up to fast and nasty.

Util is a collection of system utilities all under one menu driven roof. Among its many talents are a sorted directory, keyboard redefinition and the facility for scrolling up and down through a text file.

All of this software is available on a single disk. It comes with extensive on disk documentation to explain how to make it do its things. The whole works cost a mere

\$19.95

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Making That Modem Dance

them into one end and buffering the output rarely leaves one with what one started with. One needs a transfer protocol.

The Christiansen protocol sends data in chunks, or *sectors*, of a hundred and twenty-eight bytes each. This was a convenient size when the standard was developed, as it's the size of a sector of disk data under single density CP/M system disks. Each sector is handled separately. The bytes of the sector are transmitted and, at the same time, a checksum is created for the sector based on the sum of the bytes. Having sent a sector the sending and receiving terminals can compare the checksum values. If the values match... they usually do... the sending terminal can move on to the next sector. If there has been an error the sector can be retransmitted until it shows up correctly.

Bad sectors are overwritten by the receiving terminal and, as such, the completed file will be uncorrupted even though any number of characters might have been corrupted in the actual transmission.

Initially only CP/M based systems could use Christiansen protocol terminals. However, the protocol has become so popular that most large computers have Christiansen based transfer packages available for them. This includes the Apple, the IBM PC and the Macintosh. The Mac version is presented elsewhere in this issue.

A more complete explanation of using

these packages is presented in this magazine as well.

Modeming Without Modems

In fact, it is very often the case that one wishes to telecommunicate without actually having a modem involved at all. The most common example of this is in passing data or software from one computer to another when they use differing... and incompatible... disk formats.

We do a lot of this, and, as such, have serial links between most of the commonly found computers. Although there probably should be a better way to get information from one system to another, it is very often the case that the only answer is to port files over a serial link.

Two computers with serial ports designed to talk to modems will not talk to each other. This makes reasonable sense when you think about it. Both will have the data coming out of the same pins and going into the same pins, and simply plugging them together will connect the ins to the ins and so on. This will frustrate the machines and do nothing for their operators.

To make two computers talk to each other over a hard wire link you must create a *null modem* cable, or, very simply, a bit of paper clip art which will make both computers think they're looking at modems, instead of other computers. It's idiotically sim-

ple, as shown here in the corresponding figure. The simplest null modem connector is a pair of RS-232 connectors with a wire connecting the pin sevens together and pins two and three reversed.

Without any modems in between, data transfer between systems can take place at much higher baud rates. Most computers can be conveniently set up for at least ninety-six hundred baud, and, if you keep the cable between them fairly short you'll probably be able to move things at this speed.

Some hardware does barf at this speed even though it will theoretically handle it. Apples, for example, don't seem to like running at high baud rates though a number of popular serial cards if there's an eighty column card on the bus at the same time. You may have to fiddle with the baud rates to get something which is fairly fast and doesn't gorch your data.

While it would seem that a hardware link should be fairly secure... that is, safe from corrupted data... this usually isn't the case. Electrical noise can do just as fine a number on your bytes as can the phone company. Even moderately reliable data transfer still calls for a protocol transfer system.

Connect Charges

Using a modem is not as easy as using a printer... although, with the packaged terminal software and sophisticated hardware now becoming available for many systems it's getting fairly close. However, the power of telecommunications makes the work worth while.

While they're still programmers toys to an extent, modems can make even serious business applications a lot more flexible. Multi-user systems with additional terminals hung off them through modems make it possible to have many people access the same data even if they aren't in the same room as the computer. The latest portable computers almost universally show up with telecommunications facilities built in there. The prospect of exchanging batches of data between remote users and a central system is getting increasingly practical.

I still think of modems in conjunction with bulletin boards, however. Despite their serious practical implications, this is usually where most people start stabbing away at the carrier button. Hey, like, it's two in the morning, the video priests are the only thing on the box, ma Bell's more or less asleep, the rates are low... let's see what's happening in California!

You can almost hear the sun in that carrier.

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The Art of Grokking MODEM7



Available now for systems running CP/M, MS-DOS, Apple DOS and... for the first time ever Macintosh DOS, MODEM7 continues to out an ever growing variety of users who can't make the strange commands work. Here's a look at the nuances and peregrinations.

By Steve Rimmer

The origin of the MODEM7 programs dates back quite a long way into the mists of time and higher order dimensions. It began in the late seventies as a very small program called MODEM to effect secure file transfers over the phone. It has grown from this point, contemporary modem programs stretching to well over a hundred and fifty K of source code.

The MODEM7/XMODEM protocol, also spoken of as the Christiansen protocol after its creator, is a very slick way of passing any sort of data between two computers. It was intended to be used through modems, but it's equally useful over hard wire links. It has no inherent limitations in regard to the speed at which it will run, and, as such, can move quite a lot of data if a suitable medium is available.

Quite a number of commercial terminal packages, for a host of systems, emulate the MODEM7 protocol... it has become something of a standard on micros... but most of the packages which use it are authentic public domain derivations of the original MODEM program.

The original package, and to a reasonable degree all of its offspring, were all written by programmers for other programmers. While the most recent efforts, MDM730, for example, are triumphs of human engineering when compared to some of the first efforts, they're all pretty primitive in terms of user friendliness.

First time users of MODEM7 often liken it to a dull video game with no apparent rules, the work of a dedicated assemblage of gifted pigs and all manner of things anatomical. There's a good reason for this... it's a drag to get used to. Let's have a look at what's involved in making MODEM7 work for you.

Options

It's fortunate that, even over hundreds of revisions, the command syntax of MODEM7 remains pretty constant. Some of the more esoteric commands we'll be looking at here may not be available on your version of MODEM7, but the basic ones for sending files and so forth are pretty well universal.

When you boot MODEM7 you may or may not get a menu but you certainly should get a command prompt. The prompt goes, predictably,

COMMAND:

If you have one of the most recent MDM packages hitting "M" and return will show you a really fierce looking three page menu. Earlier packages had a command

called HLP, which would show you some stuff in some versions... it wasn't very consistent.

The menu isn't really necessary for the basic operation of the package.

There are two distinct groups of commands under MODEM7. The basic ones that you'll use most of the time are the single character commands. The more involved ones are three character commands.

The simplest single character command is T. It will drop you into terminal mode. If you call a remote system and hit a couple of carriage returns while you're in terminal mode you should find yourself on line.

You can leave the terminal mode by hitting control E, for exit. This will put you back on the command line. If control E doesn't work you have the version of MODEM7 which hangs up when it is booted on your computer. Actually, "the" isn't a very good word. Quite a number of them will do this. MODEM7 is one of those programs which must be patched... properly... for the hardware it will be running with.

If you are going to terminal to another computer, rather than to a bulletin board, you may be a bit disturbed to note that neither system will have local echo. This means that you will see what the other head is typing, but not what your own stuff looks like. In this case, one of the terminals should exit the T mode and go to E mode. This is terminal with echo.

It's a downer to have *both* terminals in E mode, however, as this will take the first character sent and pass it back and forth forever.

There is an option under the T mode which allows you to capture text. This means that you would be able to make a disk file of everything that gets typed up on your screen, or portions thereof. This is *not* the file transfer part of MODEM7, although it's often very useful in its own right.

To capture text, you would hit the command prompt and enter

COMMAND:T WOMBAT.DOC

This would open a file called WOMBAT.DOC. MODEM7 would then start up a sixteen K buffer into which you can spill text. However, you have to open the buffer before anything goes into it. You can open the buffer once you are in terminal mode by hitting control Y. This should print up a message that says that the buffer is open and print a colon at the beginning of every line.

The buffer can be toggled opened and closed as often as you feel like it. It will engulf text whenever it's open. Under some versions of MODEM7 the buffer will open,

upon hitting a control Y, only after it gets the first line feed from the remote system. You can't be sure of getting anything until the colons start showing up.

When you have captured all the text you feel like having hit control Y to close the buffer... it's control R on some of the newer versions... and control E to get back to the command prompt. We'll now introduce our first three letter command. Give it a WRT to write the buffer to the file you opened or all that hot, slippery text will be lost for all time.

MODEM7 can also send a straight ASCII file... essentially typing it over the phone line. To make this happen hit control T from inside the terminal mode. It's probably not a good idea to have the buffer open when you do this. A prompt for the file you want to send should appear and, when you've given it one, the text should start spewing out on your screen.

None of the text moving things work in the E mode, by the way.

The line feed question will often turn out to be a problem under older versions of MODEM7. When you log onto a board hit-

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The Art of Grokking Modem7

ting a carriage return will cause the board to send you back a line feed. As such, the carriage return will move your cursor to the beginning of the line it's on and the line feed will pop it down to the start of the next line. This is not the case in terminalling to another computer.

The MDM7 programs have a command to toggle the insertion of line feeds on and off... TLF... but under more primitive incarnations of the package you'll have to hit a control J after each return to avoid simply typing over what you've just sent.

Getting Warmer

There are a number of other commands which you should bear in mind before we get to the really complex dynamic stuff. Most of the newer MODEM7 packages support a command called SET, to set the baud rate of the serial port. The function of this can vary considerably, as the way in which one sets the baud rate of the various computers these things run on also varies a lot.

Usually one types SET and selects a baud rate from the list the program shows you. If you are planning to use MODEM7 to transfer files over hard wire links you'll probably find that the SET baud rates don't go high enough for your application... most of the time one only finds choices going up to twelve hundred baud, the speed of the fastest available telephone modems. You would need the source code for your MODEM7 program to be able to add more baud rates to SET.

Many modems can autodial in one way or another and, if your MODEM7 package supports it, you will be able to access this feature using the CAL command. This typically prints up a list of phone numbers and a command subprompt. You can select a letter from the list or type in a number.

The CAL command is usually pretty sophisticated, in that it will call the number you've selected and tell you whether the number is answering or busy. If you hit a busy number you'll be able to set the package up to autoloop on it, that is, keep trying it 'til it's free. The CAL function will keep track of the number of times it has tried the number.

The most sophisticated CAL functions, such as that of MEX, will allow you to set up a list of numbers for the package to try... it'll pop through each of them until it gets you logged onto something.

Some packages, including most of the MDM7s, have an alternate function. If your modem doesn't support autodialing, and, as such, CAL isn't active, you'll be able to see the number library with NUM.

If you don't have a CAL function but

you do have a Hayes Smartmodem... or something compatible... you can still have the modem dial for you. Get into terminal mode. Wait at least one second and type three plus signs. Wait another second and type ATDP and the phone number you want to dial. Hit return and the modem will dial for you. You can't autoloop this way, of course, but it's better than wearing lines in your finger with a phone dial.

The command line will also allow you to issue some CP/M style commands. DIR, for example, will show you the disk directory. It behaves exactly as does the CP/M DIR, with optional disk specifiers and wild cards. ERA, in some versions, will allow you to erase a file and LOG will let you change the logged drive.

Occasionally one will want to hang up on a call, such as when confronted by a bulletin board which can't bring down the line when you log off. This can be handled from within terminal mode by hitting control N or from the command line by typing DSC. Alternately, typing BYE will hang up the phone and return you to the operating system.

You can leave the program... without hanging up the phone, by typing the name of the operating system... CPM or DOS, the latter being for IBM PC versions. This would, for example, allow you to leave MODEM7, see how much space you have on your disk and then reboot MODEM7 without losing your connection with a remote system.

Don't take too long at it, however, as most remote systems will log you off after a few minutes with nothing having been typed.

The Main Biscuit

The most involved and potentially freaky part of using MODEM7 is, of course, transferring files with it. This is wilder as you get further back in time... some of the older packages were pretty funky in this respect.

To transfer a file from a remote board you would log onto the board and do whatever you have to do to get it to initiate the sending of a file. Under RCP/M boards, the most common type, you would

A0>XMODEM S WOMBAT.DOC

This should start the remote version of MODEM7 going... assuming that a file called WOMBAT.DOC was on the disk. When the remote system says it's ready to send you would hit a control E to get back to your local command line and then

COMMAND:R WOMBAT.DOC

The "R" is for receive, and the file name is what the data will be received as. It's important to realize that the filename you type at your local terminal doesn't have to match the one on the remote board. Your local file can have a disk specifier if you want it to, as in

COMMAND:R B:WOMBAT.DOC

The MODEM7 protocol specifies that data be sent on chunks of one logical sector, or a hundred and twenty-eight bytes. Once a whole sector has been passed over the wire a CRC check is done at both ends and compared. If the checks match the terminals will send the next sector.

This being the case, your terminal will say

Awaiting sector 1 (0001H)

and then sector two, and so on until it's done. It never knows if it really has a sector until the sector has been received.

If the CRC check doesn't match MODEM7 will print one of a number of cryptic error messages and try to send the sector again. This is often what happens if Ma Bell burps or someone picks up the phone while you're modeming. Assuming that MODEM7 manages to get the sector through eventually it will pop along to the next one as if nothing had happened.

Eventually, when all the sectors have come over, you should see the message

All Transfers Completed

This largely ensures that the data sent is actually valid... I think that the chance of there still being glitches in it is something less than one half of one percent. If MODEM7 can't get all the sectors across it will throw some more error messages and abort the send.

Having completed a transfer most of the older MODEM7s will pop you back to the command line, from which you would hit T to get back to the terminal. The later MDM7 incarnations return you directly to the terminal mode.

Sending files up to a board is largely the same process in reverse. You would get on the board and say

A0>XMODEM R WOMBAT.DOC

and then, returning to your command line

COMMAND:S WOMBAT.DOC

The Hard Way

Sending data over a hard wire link, or between two versions of local MODEM7 packages, rather than MODEM7 and a

bulletin board, should be no different than the normal usage of the system, but, in fact, it can get a little wild. A lot of this is often due to the use of hardware which isn't up for running it higher baud rates coupled with old MODEM7s.

In sending a file between two computers... or *porting* it, as the programmers say, one would essentially place one MODEM7 in its send mode and the other in its receive mode and let it rip. You may get a couple of timeout error messages before the two programs synchronize themselves, but this is largely cool. However, you also may run into the checksum CRC troll that lives within some of the less slick implementations.

The earliest MODEM7s checked the validity of each sector using a checksum. Later on, cyclical redundancy checking was implemented. The ensuing versions embodied a system which figured out what the other terminal wanted to do and tried to do the same. This worked by trying for CRC checks for a while and, if this failed, defaulting to checksums. Sadly, both ends must be in accord as to which of these protocols it will be using and, at high baud rates it's quite easy to have one drop into its checksum mode while the other still wants to send CRCs.

This produces lots of error messages until you hit some control Xs at both ends to abort the transfer.

If you run across this hale the best approach is to force both ends into their checksum modes: This is certainly reliable enough for a short hard wire link. You can do this by getting the receiving terminal going and waiting for it to print

Switching to Checksum Mode

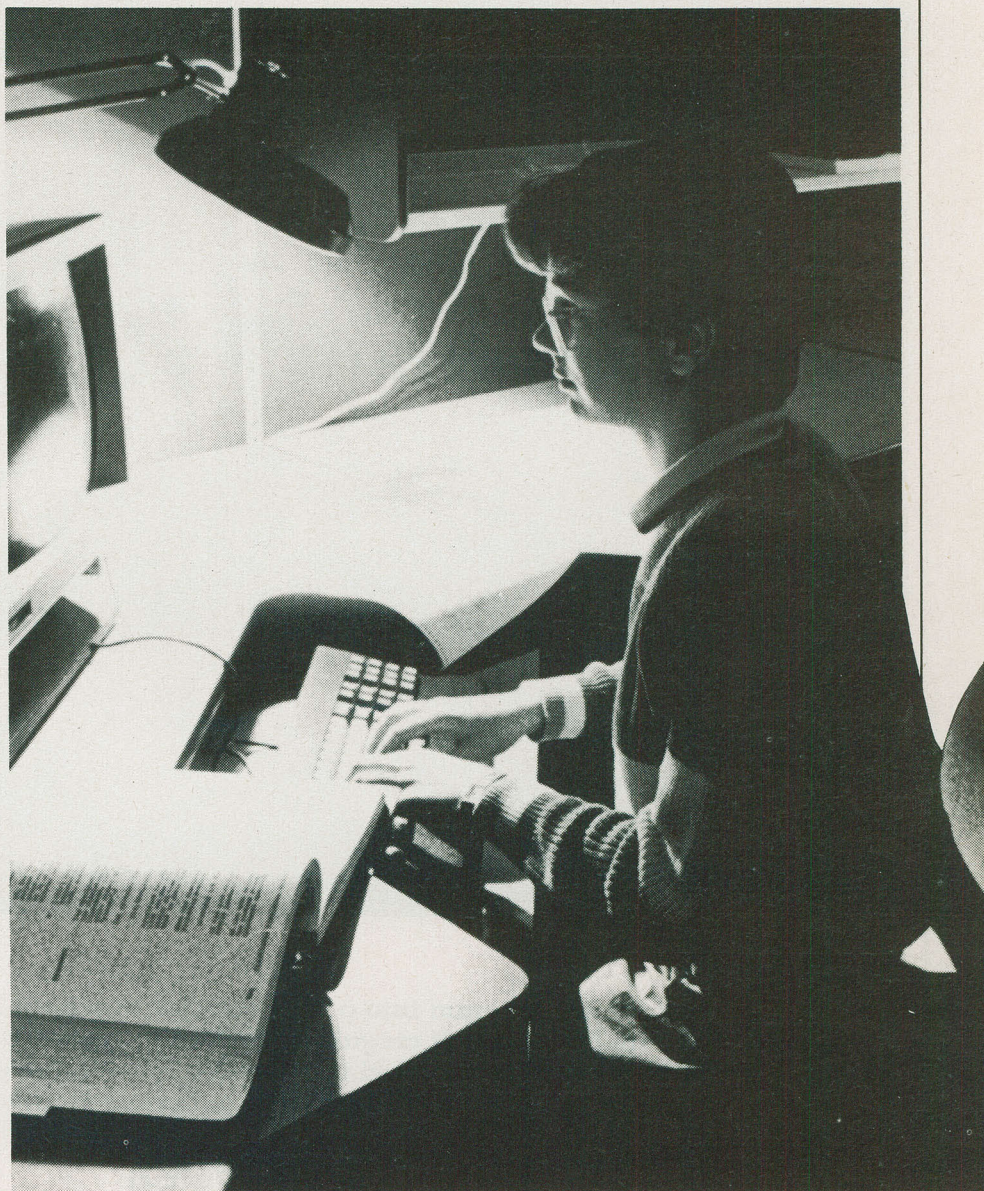
You would then start the sending terminal.

The later MODEM7s and MDM7s allow you to toggle which mode you want to be in using the TCC command. This largely eliminates this hassle.

Finally, in sending large numbers of small files between systems one is generally faced with rather a lot of typing. This is a downer and, if you're using one of the more recent packages probably unnecessary. There is a little know feature of the more sophisticated MDM7 package called *batch mode*.

Batch mode is rarely available on bulletin boards but it can be used if both MODEM7s on a hard wire link can support it. You might, for example, want to send all the COM files on a disk over the link. To do this you would say

COMMAND:SB *.COM



This is "S" for send and "B" for batch. You would then use "RB", receive batch, at the other end. In this case the MODEM7 package would transmit the file names it's using as well as the data, and the files would be preserved, names and all. Batch mode transfers tend to be a bit tricky at high speeds under some MODEM7s, as the package may not wait very long for the initial name signal.

BYE, DSC, CPM

While most versions of MODEM7 add some wrinkles to these basic commands... often as a result of the hardware they're plugged into... this is enough to make the package

work for most applications.

Most of the commercial packages which support the MODEM7 protocol for other systems will differ from these commands considerably. However, the protocol itself will work the same and, as such, can be used with true MODEM7 terminals and boards.

MODEM7 is a bit of an orangutan's brandy snifter, to be sure. It's highly weird. However, like so many other standards and *de facto* standards, it has kind of evolved itself into acceptance. It's almost essential that you know how to work it if one is going to do any serious telecommunications. **CNI**

HP Portable Review



The power one can cram into a case the size of a book is phenomenal. Here's a system with about a half megabyte of RAM, a screen, a full size keyboard, IBM compatibility and a full sized five headed turret lathe all in a box that weighs less than ten pounds. Wait, no, the turret lathe is an option.

by Steve Rimmer

If its batteries hadn't snuffed it part way through the voyage I probably could have written this review on the way in to work. My noble 1975 blue Chevy pickup, chariot of the gods and faithful servant of one four billionth of the human race burned a valve and I had to revert to passenger status. I had the thing on my lap and I was all set to type away when the low battery warning came up and the screen partied out.

It was a manifest indignity. The TRS-80 Model II was, likewise, dead when I rumbled into work and I wound up banging away on an IBM clone.

However, if the batteries hadn't expired I really could have written this review during the trip. For this, you see, is a review of the Hewlett Packard portable system... the title did sort of give it away, didn't it... The HP is among the first systems I've gotten into which could motor about, compute while in transit and still be said to be capable of doing intelligent, meaningful work without the use of special magnifying contact lenses.

Unlike almost all of the portable systems that have cropped up of late, the HP has a decent sized screen, a real, useable keyboard and... but hark... an operating system. In addition to this, it features an off-

board disk drive to expunge its memory into and a large choice of available software.

You also get PAM. PAM is a chesty blonde nymphette which the designers had genetically duplicated as a peripheral for the portable computer and...

Or maybe not.

Migratory Fiberglass

The HP Portable proper consists of a single box with no cables at all. It fits in a fake leather tote bag that looks *el trencido* in the same way purple Nikes do. When it's used in its portable space the HP has no disks or, in fact, anything else to port around with it.

The disks... along with everything else the system does... are configured in memory. The "drives" one accesses from the operating system or from applications software are blocks of memory. They behave just like real drives, except that they work instantaneously and there are no little red lights to watch.

Having nothing much sticking out of it, the case of the HP is kind of featureless. There are two catches on the front which can be fingered and groped to release the lid. In true portable style, the lid swings up to become the screen. The keyboard lurks where the top used to be.

Now, to get into all this, the arrangement of the swinging top and the keyboard have been properly pondered upon and considered... the design fairly reeks of month long committees and delegations to study and peruse it. It allows one, among other things, the pleasure of adjusting the screen to any angle.

This, as it turns out, is highly essential. The screen of the HP is a bloated liquid crystal watch display. It can handle sixteen lines of eighty characters each, or about two thirds of what you can peruse on a regular monitor. However, being a liquid crystal panel its viewing angle is quite critical... it's quite easily washed out or glared into oblivion, especially by overhead fluorescent lighting.

The keyboard of the HP is a really decent trip. It is, for one thing, considerably better to use than the keys of this despicable clone I'm typing at. While there have been a few obvious compromises in the thing to get all the keys in a confined space... the delete key is a shifted escape, for example... the whole toad ranch comes off as being pretty decent.

The keyboard provides for eight function keys, cursor movement keys and several special purpose keys which relate to the HP custom software we'll gawk at in a moment. The action of the keys is not as good as that of some of the nicer systems we've checked out... certainly not as good as those found on some other HP equipment... but they're certainly more than useable.

The HP keyboard is, to be sure, the best one I've yet encountered on a pocket sized portable system.

All Right... Boot It

The HP Portable doesn't have a power switch because it's always on. It uses CMOS chips to make itself happen and, as such, it can cook away for quite a long time on its internal nicads. If you close it up and leave it alone for a few minutes it will automatically

shut down its screen to conserve power.

The first interesting aspect about the system in this respect is that, inasmuch as it never gets shut down, the HP never has to reboot... well, almost never; we'll get to that. If you leave off doing something in the word processor, for example, and fold up shop the word processor will greet you, right where you left off, when next you rap the HP on its little head.

The system will wake up and come on line, its screen popping to life, as soon as one hits a key on the keyboard.



Specs

System:	Hewlett-Packard Portable
Operating System:	MS-DOS
RAM:	272K
Disks:	External 3 1/2", RAM disks
Software:	MemoMaker, Lotus 1-2-3, Terminal, other software available
Interfaces:	Serial Port, RJ-11 phone line, HP peripheral port
Manufacturer:	Hewlett-Packard
Distributor:	For local dealers, call HP's toll-free line: 1-800-387-3867 (or -3868)
Price:	\$4748.76 (FST included)

In most cases one will get the system going and find one's self square in the middle of PAM. This sounds mildly erotic, to be sure, and, perhaps, if you're a byte it would be. PAM is, in this case, the Personal Applications Manager. It is, in fact, a very slick menu thing which seems to accompany all Hewlett-Packard systems.

The operating system for the portable is, in fact, ever vigilant MS-DOS 2.0... or, at least, a variation on it. We'll look at exactly what it's up to in the full rich passing of time. It's usually the case, however, that one will not encounter MS-DOS in the normal running of the system.

When MS-DOS figuratively boots on the HP, it AUTOEXECs itself into PAM. As such, one normally sees the PAM menu rather than a DOS prompt. You can easily get to DOS if you feel a need to do so... it exists as one of the applications menu selections under PAM.

Manipulating PAM is idiotically simple. Each of the applications which is available for use on the system is rendered as a box on the screen. There's an arrow which can be manipulated through use of the cursor movement keys. Blast the arrow over to the application you fancy, hit the return key... or the specially provided "select" key if you want to be high tech about it... and the program of your dreams will impinge itself on the crystals.

PAM also allows one to set up a number of parameters for the system using subsections of itself called through the function keys. The functions of these keys are typically presented in eight little black two-line boxes at the bottom of the screen, along with a running clock display.

The clock is, in fact, one of the first things you'll probably want to set up. It's perpetual, of course, and maintains the correct time even when the system shuts itself down. However, because the system is portable it's designed for easy updating by time zone. You can leaf through a menu selected flock of time zone mnemonics to find the one you're in and the clock will automatically correct itself.

All of the system settings remain set after you've PAM'd their karma until such time as you decide to have at them again.



The computer, its disk drive and a printer.

HP Portable Review

PAM also provides for the setting of its internal modem. Of course it has one of these... it's almost a prerequisite of any portable system. It can telecommunicate at speeds up to three hundred baud, autodial and plugs into the all encompassing global phone spaghetti dinner with a single RJ-11 plug.

Finally, PAM can configure the computer and itself. The former consists of selecting the size of the cursor, the time before the screen nods off and so forth. The latter allows one to choose which of the applications packages on the computer's virtual disks will appear on the PAM menu.

It's worth noting, in all this configuring, that the system comes with PAM installed and ready to toot. All of the defaults are set up to be cool in most applications, and, as such, most heads won't have to change anything about PAM... unless you just can't abide an underscore for a cursor.

The Soft Side

The HP comes with a software bundle, as do most computers that aren't imported from Taiwan... but it's an interesting one. This is among the few systems, for example, that doesn't come with WordStar. It does have a sort of a word processor, though, called MemoMaker.

If you put MemoMaker on a full sized computer you'd probably call it a weak, gutless sloth of a word processor with little future for writing novels. This probably isn't a particularly unfair assessment of it when it's stacked up against WordStar or MultiMate. However, stashed in a portable it's certainly adequate for doing small text files... letters, reports, short articles and the like.

MemoMaker has most of the basic features the almighty handed down to the word processor prophets. It does automatic line ending, some basic text formatting, line scrolling and so forth. More advanced stuff, like multiple fancy tabs, block manipulations and inserting text into the middle of a paragraph are there, but they're a bit tricky to use.

The block handling aspects of the package are particularly weird. This is partially due to the limited manipulation facility one has over the format of chunks of text. The thing maintains a virtual clipboard buffer and copies text in and out of it. However, when one moves something out of the buffer it retains the same relative screen positioning as it had going in.

While this shouldn't make using the block moves any less flexible, in practice it makes the whole works feel a bit awkward.

In fact, MemoMaker behaves about as



The portable can be a fairly powerful desk top system, especially when it's connected to additional hardware.

well as any small word processor. It makes a fine text editor... probably a better description of what it is... but it strains a bit on large documents and complex formatting.

It would be the flight of a stoned albatross for creating program source files... it seems ideal for the task... sadly, though, this isn't really what the system is intended for.

The HP also comes with Lotus 1-2-3, which I won't say much about except that it behaves, perhaps predictably, just like Lotus 1-2-3 on larger systems. It's extremely fast when it accesses its disks, of course.

The other clever bit of software which lives in the HP is a sophisticated terminal package. Far more than just a dumb terminal, this thing associates itself with the built in modem... or an external modem through the system's serial port... to do all the neat stuff. It will handle automatic dialing, autoloop, macro configuration blocks, assorted protocols and... slickest yet... MODEM7/XMODEM file transfers.

The terminal package appears to have been designed to be used by remote users of a large central system... with only one phone number. You have to install the phone number you want to call in the configuration menu... it'll stay there 'til the cows

come home... and then just hit the function key that offers you a quick dial.

The configuration menu also allows one to specify things like a logon string, a whole host of parameters and so on. However, the coolest bit of all this is that you can save this menu to a file, and boot the terminal with one of these files to log you onto your favourite cat scratch automatically.

The terminal software works extremely well... you can actually make it do useful things, rather than simply display a blinding flash of text across a tiny screen, the lot of most portables. The MODEM7 download function is profound, allowing for the passing of programs and text files to and from other systems.

It is worth noting, however, that this does not give one access to quite as much software as one might think. Some standard MS-DOS based stuff hangs when it's ported over to the HP... methinks it wants some patching. This isn't normally a hassle... Hewlett-Packard offers a reasonable selection of applications for the system. However, it would be uncool to assume that you can beam over anything you need and let it rip.

Hanging the computer, by the way, entails resetting it with a tiny unmarked black button in the system's battery compartment.

This doesn't seem to trash the contents of the RAM disks or any of the important system stuff... unless the hang already overwrote the memory... but it does do in an assortment of settings and counters. For example, it resets the battery status indicator to showing the batteries as being fully charged. It won't regain its proper setting until the batteries actually are charged up again.

Other Tunes

Unlike most other portable systems, the HP does have a real mass storage device... you can plug it into a second box which holds a three and a half inch disk drive. This thing is actually battery powered too, and it can be ported along with you, although it isn't nearly as careful with the juice as is the computer itself.

The disk drive allows one to move data and programs in and out of the HP without having to resort to tenacious serial port dumps and other high tech mysteries. The drive appears to be compatible with the tiny drives of the other HP MS-DOS based systems, so, presumably it the files of the HP

portable could be utilized by desktop systems as well in this way.

This stuff would have all been a great deal more useable if the drives had read IBM style five and a quarter inch disks, making the whole works media compatible with the rest of creation. As it is, one is locked in to the HP hardware pretty tightly. The boys in the marketing department had a say in this too, I think.

The three inch disks, it should be said, do seem to travel better than their five inch predecessors, though. Their non-floppy exteriors are impervious to pocket lint, moderate coffee deluges, paper clips and other environmental nasties.

The HP portable is unquestionably among the most approachable of all the portable systems I've had a chance to boogie with to date. It has a useable screen, a fair to middlin' keyboard, a real operating system and it runs a good selection of software. The availability of an external disk drive... albeit a weird one... improves its usefulness for many applications by an order of magnitude.

The PAM system, which HP seems to think very highly of, isn't bad when one is getting started and, more to the point, can be dispensed with if you decide you don't like it any more.

Like most Hewlett-Packard equipment, the portable is well built, well supported and... I think the phrase is "up market". It means "somewhat expensive", in any case. However, if your application calls for a portable with some lungs in it you may well find the little dwarf worth what it costs.

Of course, the real marketing potential in something like this has, regrettably, been wholly missed by the suits. It's a shame, too, because it really could have been a concept. What they should have done with this thing was to have put a belt clip on it and given it tiny headphones. People could have ambled down the street computing happily as they walked, oblivious to the noise of the city, the crowds and the busses that were about to make them into statistics.

The *Computeman* still seems to be a thing of the future. **CNI**

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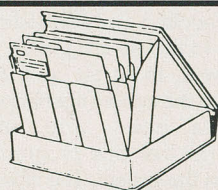
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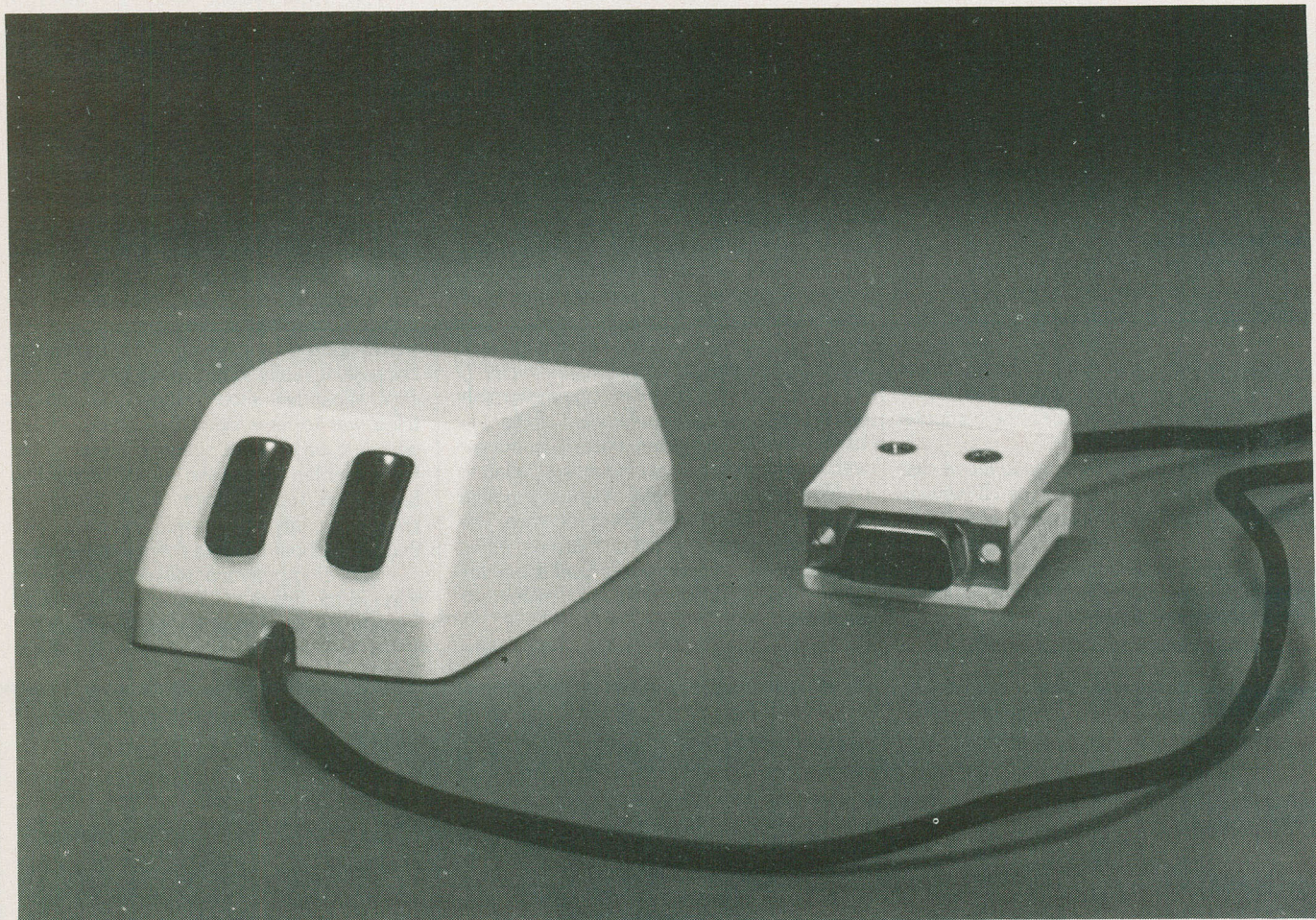
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The JLS Mouse



Not that long ago mice were decidedly shunned from anything to do with computers. They were thought to gnaw on the tubes and relays. Times have changed, of course, and now, having learned to cover them in fiberglass and make them hatch trackballs, rodents of all breeds are being embraced by silicon jockeys. Here's a look at one of them.

by Steve Rimmer

One of the casualties of our times... modern times, perhaps... is the computer patriot. You've probably encountered these characters before. They not only like the machines they own... they're loyal to them. In fact, they'll defend their virtues to the death, usually even if the thing has been obsolete since 1976. Yes, those PET 2001 freaks are a sorry sight.

The most recent feuding has been between ardent PC owners and the bearers of the Mac. This one is especially fun to tune into, because the two machines are quite different. Both sides can hold up banners for things they have and the other hasn't. It's a real drag out at times.

Now, I can relate to both to about the same extent. Both systems have advantages and... having both at my disposal... I am usually able to use each for what it is best at. There are times, however, when one wants

to have bits of one in the other. Colour graphics on a Mac would be trendy. This article is not about that. A mouse for the PC would also be a decent hybrid.

This is a little easier to do.

There are in fact, several mice available for the blue beasts. The most common of these is the Microsoft mouse. It gets plugged into the system's serial port and linked into the operating system by a small utility that gets run before booting the application in which one wants to mouse around in.

This works well, in so far as it goes. However, it ties up the system's serial port... assuming it has one... and entails remembering to get that little program going when you start the system. The little program has been known to choke on some bizarre code.

Thus was born the JLS mouse. A creation of Joe Sutherland... he also builds com-

puters... it gives any PC the power of a Microsoft type mouse without the drawbacks. In addition it features a number of interesting enhancements.

Mickey, Donald and Pluto

Unlike as in the case of less slick mice, the JLS mouse doesn't use a serial port or a driver. It plugs into the keyboard port, with the displaced keyboard, in turn, plugging into it. The mouse is powered from the same supply as is used to drive the keyboard itself, so one need not fear adding another octopus to one's already drooping stack of them.

The mouse's circuitry uses a dedicated Z-80 to read the happenings at the end of the cable and translate them into IBM style characters. If one moves the mouse to the right, for example, the mouse circuitry will output the bytes 00H and 4DH, which is what would have been sent to the computer had one hit the right arrow key on the numeric keypad. The mouse, then, fools the PC into thinking that all the codes are being generated by its own keyboard.

The PC's keyboard driver code can actually accept quite a lot of data quite quickly... a lot more, in fact, than can be generated by simply holding down a key on the keyboard so it auto-repeats. As such, quickly mousing across the table doesn't overflow the system's keyboard and send it into paroxysms of bleeping.

In addition to its generating the four cursor movement codes, the mouse will also emit a carriage return if you hit its right button.

Field Mice

The usefulness of the Microsoft mouse is a bit limited in that the software which is going to be moused must be happy with the mouse driver. Admittedly, almost everything is. However, absolutely anything which can accept cursor positioning keystrokes can handle the JLS mouse... software running on the computer can have no way of knowing if it's getting data from the keyboard or from the mouse.

The mouse works well, for example, under WordStar. WordStar is none too fast under the PC, so doing things like scrolling through a whole document using the mouse is no more practical using it than it would be moving around solely by using the cursor keys. However, one can mouse around a page as if the thing were a Mac. In fact, locating the WordStar cursor with the JLS mouse is considerably easier than is positioning the Mac cursor.

This is partially due to the characters on

the PC's screen being rather larger, with fewer of them to worry about. However, the mouse is notably easy to use in this respect, with a minimum of hand ballet required to get the blinking box where you want it.

It took a bit more work, in my case, because I only had about ten square inches of desk top to roll it in. This is not the toy for people with no flat space to speak of.

Using the mouse under GWBASIC is a serious party. The editing facilities of BASIC are already pretty fine, but being able to boogie around the tube is a blast. It makes changing one's code about as effortless as it can be.

The JLS mouse is, of course, equally at home under different operating systems. Inasmuch as it doesn't require any driver code, booting up CP/M 86 or QNX, for example, won't make the mouse in the least bit unhappy. Software will still be able to access its codes if it could previously make use of the keyboard's cursor positioning stuff.

Mouse Holes

The JLS mouse is available in a plain vanilla form or with a final high tech enhancement. Many users of the PC will know that it's possible to disable the insistence of the machine to know the time every time you boot it... the procedure is explained elsewhere in this issue. However, doing this means that, like Tommy, it won't know what day it is.

One can eliminate this temporal ignorance by the purchase of one of many real time clock cards. However doing so ties up a slot, slows down the booting process a bit and, finally, adds yet another driver program to run when the system comes on line... this one to hook in the clock.

Because the JLS mouse hooks into the keyboard port, and because the computer wants to have the time and date typed in *through* that very keyboard, it is possible to get the mouse with a built in real time clock. The clock doesn't do much when the system's running, but when you boot the PC it waits until the appropriate moment and spews out the time and the date through the keyboard port.

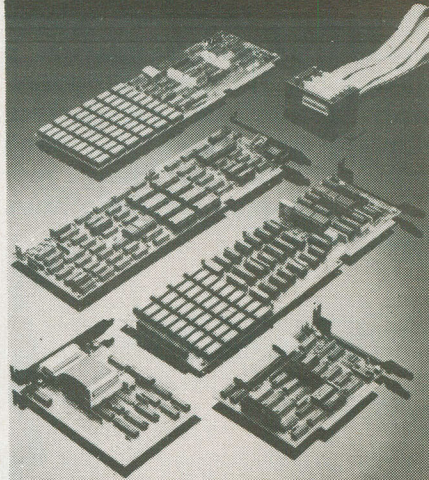
Finally, of course, the JLS mouse was designed and built in Canada by one of this country's oldest and most respected builders of PC clones... been at it almost a year now. Joe Sutherland continues to create first rate hardware, with good support and other innovative wombats within.

CN!

For more information about the mouse contact JLS Electronics at 94 Beverly Street, Toronto, Ontario M5T 1X7 (416) 598-2771.

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The Silicon Lathe

Turning a lathe to precise measurements requires a steady hand, an unfailing eye, and a lot of repetition, something computers don't mind at all. You knew your ZX-81 was good for something, didn't you...

by Bruce R. Evans

How often at a trade fair have you drooled over a one hundred and forty kilobuck industrial robot?

"What potential!", you calculate as it tirelessly stamps out widgets.

"What software!", you rave as the salesman waves sheets of code at you.

"What price!", you gasp as you move on to the next exhibit.

Ray Bilsky did all this. Then he went home and took stock. In his small Oshawa, Ontario factory, he had a FUGI model CF-VO-B Vertical Milling machine and a TIDA model TD5-AA thirty-six inch metal lathe. With this and less than ten thousand dollars he developed his own industrial robot.

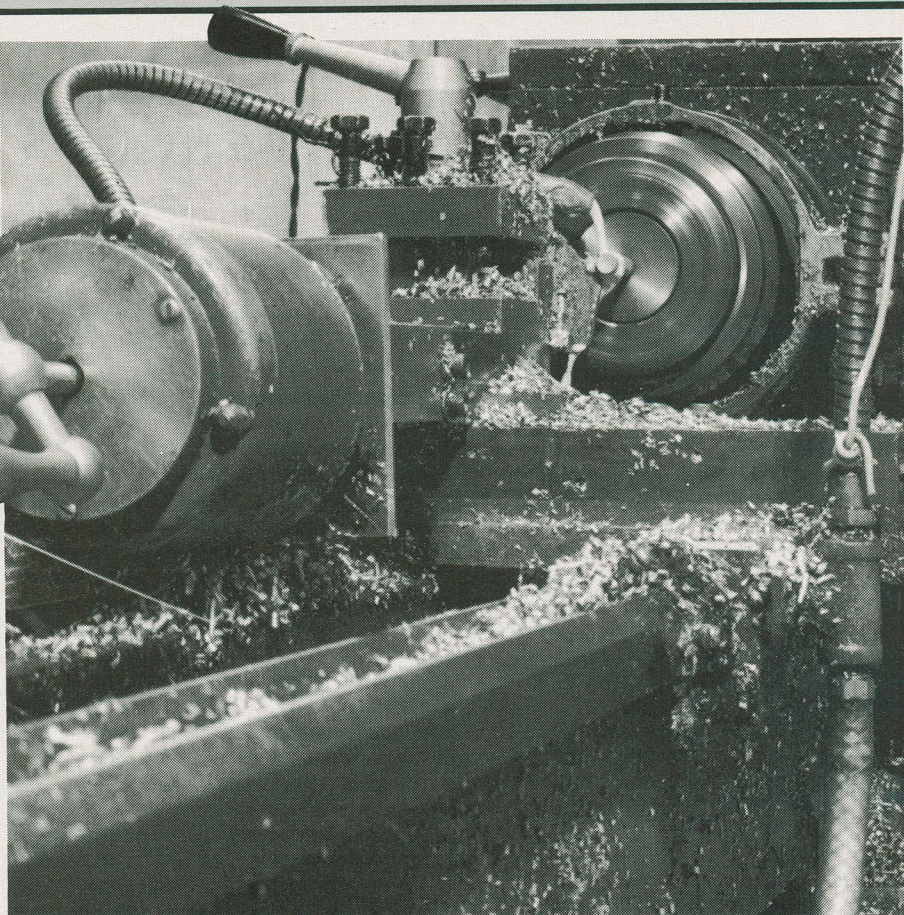
Now he does custom milling and boring without requiring a skilled, salaried machinist. Under program control, the milling head moves in three axes relative to the work... side-to-side, back and forth and up and down. In addition, with a sensor probe replacing the milling head, his machine will trace a template, store the co-ordinates and then produce endless copies.

More dramatically, his computer-driven lathe has made him number one Canadian producer of rollers for glass fibre fabrication. Here it is necessary only to control the longitudinal travel of the tool rest and the cross-travel of the cutting tools or drills. Twelve feet of aluminum tubing put into the machine at 8 A.M. is transformed into two hundred and twenty dollars worth of glass fibre rollers by noon!

Let's see how he did this.

Getting Started

First, you need a computer to run your system. A SOL-20 and an IMSAI were used for this application. Both ran North Star single density, dual drive disk systems. If



two such relics can do the job, your micro certainly can. This combination also smashes persistent myths that personal computers can't hack it in an industrial environment.

Next decide how you'll write the software. Use what you're most familiar with. Ray used North Star BASIC and Supersoft's Arian assembler to write machine language subroutines. Today this may seem unsophisticated but when he started this was all that was available. His system, though, needs no apologies; it works. If he were doing it over, perhaps he would use a BASIC compiler but this doesn't invalidate his system.

The control software, unlike Gaul, is divided into two parts. Eight hundred and fifty lines of assembly language code actually run the machinery, handling measurements and feedback. Only machine language subroutines are fast enough. Meanwhile, a BASIC program looks after console input, CRT housekeeping and disk maintenance. There's no reason that this second part couldn't be written in assembly language but that's the hard way. Higher languages lend themselves to user-friendly menus and programmer-friendly overlays.

Take advantage of this. Naturally, if you're using a dedicated controller or a homebrew computer, you'll have to write everything in assembly language.

Although the challenge of controlling a milling machine and the lathe looks insurmountable, the most important step is to define the problem. However trite this sounds, it is essential. Take time to analyse what the machine does, how you do it manually now and break this down into discrete steps.

Let's start at the back of your computer. You need some form of I/O. If you have a 6502 or 6800, you must use memory mapping. If you are using an 8080 or one of its descendants, you have a choice. There's lots of good hardware available to help you. An 8212 was implemented in this case, but a P.I.A. chip would have done as well. The data sheet will give you ideas on how to build a full interface board. From there the I/O driver is a simple assembly language assignment.

Step Lively

The backbone of all control applications is the stepper motor. A thorough discussion of stepper motors is beyond the scope of this

Continued on page 41

Software Now!

The difference between we humans and the other inhabitants of the planet, is our capacity for making tools. Civilization is often measured by its grasp of technology ... it's through his use of tools that man has come to be able to manipulate his environment.

The computer is the ultimate tool ... it is, like man himself, unspecific, and thus adaptable to virtually any task. The same computer can be a bookkeeper, a game, an artist's palette, a composer's amanuensis, a word processor or a programmer's development station.

The computer itself is simply a box full of chips. The power of computers lie in the software that runs on them.

Software Now! is the magazine for people harnessing the power of the microcomputer. In its pages, you will find the information which you will need to choose and apply the software that will dedicate your computer to your tasks. It will help you make sense of the myriad of similar software packages, translate the intricate complexities of software claims, understand the watershed breakthroughs in software development ... and even have a bit of time left over to dematerialize a few aliens.

Perhaps most exciting, however, is that the pages of **Software Now!** contains news about software for applications you've never even considered running on your computer. Imagine having an overview of the work of the world's most gifted program developers ... and you'll have a good idea as to what **Software Now!** is about.

Software Now! deals with a broad range of systems and applications, encompassing eight, sixteen and thirty-two bit machines, and software as diverse as video games, drafting systems and spreadsheets.

Features In The Queue

Here's some of the editorial line up for the next few issues of **Software Now!** You can expect it to change a bit ... new software springs up almost daily, and **Software Now!** is always featuring the most important developments in this dynamic field.

Computer Aided Drafting On a Micro • Techniques in MacPaint • How to choose a Spreadsheet • Apple Software Crate • Getting to the Root of UNIX • The Digital Research Pantry • A Thousand and One Word Processors • IBM's Productivity Family • Can Mac Write? • Professional Software Roundup • Power Programs for the 64 • Approaching the C • Word Processing Support Programs • dBASE II Enhancements • Will it Run Multiuser? • Concurrent CP/M

Reviews (typically 10 each issue): 10 Base • Mighty Mail • WORD-BASE • Easy Script • Computer Chef • Electronic Circuit Analysis Program • Superex Retailer • MAI Basic Four • The Print Shop • TKISolver • Microsoft BASIC for the Macintosh • Sundog • Turbo PASCAL for the IBM • AutoCAD • MultiMate • Lexichack and Word Juggler • Dataflex • Symphony • Omniterm 2 • DB Master • Paint Magic

In addition to this, look for these regular features:

The Library	(Monthly survey of books)
By The Board	(Public domain software)
Arcade	(A look at the latest games)
Short Film	(An overview of new releases)



We've reached a level of development in microcomputer software wherein one needn't be a computer genius to apply a computer. In fact, one can operate a computer with only a bit more expertise than one needs to successfully make toast. The key that will unlock the power of your computer is the software you plug into it.

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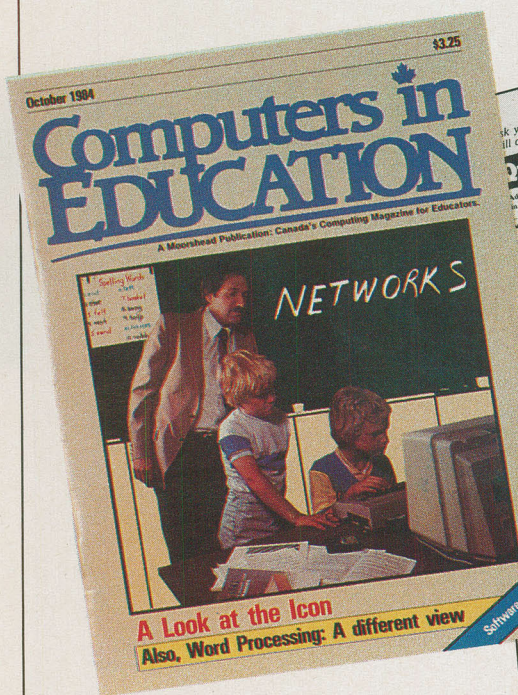
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Computers in Education is Canada's only dedicated magazine for the educator involved with microcomputers. There are articles on the latest developments and technology, others on beginners guides to languages etc., but the emphasis is on software.

There are between 6,000 and 11,000 educational programs (so many that even we are not sure of the total) — some of them can only be described as junk, while others are superb. Sorting out the good from the bad is a horrendous task, but **Computers in Education** can help. Also there is a section on electronics with a build-it-yourself project, technical tips and more.

Features in recent issues have included: The ICON Computer, 10 Things to do if it Doesn't Boot, Beginners Terms Explained, Floppy Disks, Extra Ports for your Computer, Overview of Word Processing, Word Processing Mini-Survey, BASIC Tutorial, Microcomputer Buyers Guide, Canadian Computers and Courseware, Computers and the Handicapped, Computer Learning Systems, Logo: Opening Doors, Survey of School Computers in Canada, Computer Assisted Testing.

Software Reviews: Rocky's Boots, Coco, Touchtype, Golf Classic and Compubar, Report Card, Delta Drawing, Apple Writer, Magic Window.

Electronics Today

INTERNATIONAL



The world of electronics is changing, not year-by-year, but day-by-day. Our future depends heavily on the developments in the electronics field: computers to speed the flow of information and to remove the drudgery from our lives, control systems to improve productivity in our factories and offices and to reduce energy wastage. Entertainment is also now largely electronic: TV, VCR's, Hi-Fi and information systems such as Telidon.

Defence, communications, navigation . . . the list goes on and on.

We are living in an electronic world and **Electronics Today** reflects this, keeping you in touch with what is happening and what is changing. Each month **Electronics Today** reports on new products and applications as well as presenting circuits and state-of-the-art projects.

Features: A vast range of subjects are covered in the magazine, from microwave ovens to music synthesizers to satellite communications, but this gives only a glimpse at the true scope.

Projects: Each month **Electronics Today** describes at least two electronic projects, a high proportion of them designed, built and tested in ETI labs. Almost all build into attractive units using printed circuit boards available from several sources.

Circuits and Design: Most months **Electronics Today** carries a "Circuits" feature, which either describes a multitude of applications for a particular device, or different circuits for a given application. These are invariably written by professional circuit designers.

Microcomputers: Each issue of the magazine has a computer review as well as a regular column "Computing Today" plus several other articles and frequently projects for the advanced microcomputer user.

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**Computing Now! is
Canada's fastest
growing magazine (1983-84)
Independent Evaluation**

Computing Now!

You can't go outside any more without being inundated with advertisements for computers. In fact, even staying inside won't help very much, unless you unplug the TV and the radio and threaten the postman with violence so he'll stay away. Computers are becoming as much a part of our culture as are TV, cars and central heating. In five years, computer illiteracy may be as much of a handicap as print illiteracy was five years ago.

Despite the colourful advertisements that have turned up in the media for computer hardware, micros are still understandably forbidding for many people. In fact, though, most new computer owners are amazed at just how small the leap from unpacking the thing, to getting it to do what they want it to do really is.

A computer is an everything tool. It can do anything you can conceive of having it do, limited only by your own ingenuity in telling it how. This is the art of programming, an experience not unlike that of an artist with every colour of paint imaginable and a blank canvas the size of Australia. However, the canvas of a computer never gets full... the more you learn how to do, the more you'll realize it is possible to tackle.

Computing Now! magazine can be the most useful accessory you can buy for your system. Every issue is stuffed full of news about products which will enhance your system, programs to run on it, ideas and applications to give you new things to do with your machine, articles about programming techniques, and tricks to make your computer a better tool for realizing your ideas, and piles of other features to help you get the most out of your system.

Whether you are looking at a computer as a hobby or to run your business, **Computing Now!** can provide you with information and applications to make your system the most useful thing you've ever bought next to the can opener. The articles in **CN!** are written by people who are using computers daily, and are among the most experienced small computer users in the country.

Computing Now! is published and wholly owned in Canada. As such, the articles and advertisements in it relate specifically to products you can get North of the border. There is nothing more frustrating than finding something interesting in an American magazine, only to discover that it will take four months to drag it through customs.

We know microcomputers and we practise what we preach — in fact, we are probably one of the most computerized companies in Canada. Here are just some of the systems we currently own: Apple II and compatibles (15 systems); Apple Macintosh; IBM PC and compatibles (BEST; Corona, Columbia, JLS); Nelma Persona (2); TRS-80 Model II (2); Commodore 64; Vic-20; Commodore PET; ZX81; if800; Acorn Atom; Multiflex. These are just some of the systems we own and use ourselves; our contributing editor's systems are additional to this list.

With powerful computers becoming widely available, you can't afford not to be aware of the expanding universe of micros. **Computing Now!** can provide you with an understandable, incisive and varied insight into this powerful new technology. It is written to be

both understandable by the beginner and informative for the more experienced user with a depth and variety unequalled by any other contemporary computer publication.

Recent articles: Local Area Networks • Hexes and How to Throw Them • Interrupts on the IBM • Review of Three IBM Clones • Bandit (a game) • What is MS-DOS? • Rescuing Lost Data on the 64 • Backing Up Protected Disks • Stockboy (an inventory control program) • Computer Aided Drawing • Survey of Portables • Infomart • Digging up CP/M • Drum Card Review for the Apple • Review of the HP 150 • Hacking Modem7 • How to Use the Smartmodem • CP/M MAC Macro Assembler • Popular Business Software Directory • Explaining the IBM Serial Interface • Directory of Microcomputer Paraphernalia • Xerox Service Centres • CN!'s Most Asked Questions • dBASE II Report Generator • Dimension 68000 Review • Review of Radio Shack's 2000 • IBM Telecommunications • Business On Line • A Potful of BASIC Routines •

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Stockboy Inventory Control Package

When we first advertised this program, we would have been pleased with a fraction of the orders we received. On reflection we should have appreciated what a bargain it is. Inventory programs are generally pretty expensive and some of them are inflexible and some even badly engineered. You may find that even small inventories generate enormous files.

Stockboy is a good, powerful, flexible bargain-priced package which will handle inventory for small businesses. We use Stockboy within Moorshead Publications for our own inventory control and it has stood the test of time.

Stockboy can:

- Maintain an inventory database with current, maximum and minimum stock reporting when an item needs re-ordering.
- Be a point of sale terminal, adjusting the stock data base on line.
- Produce individual packing lists.
- Generate a customer list to be used in mass mailings.
- Run on any CP/M or MS-DOS based computer, even an Apple II running with a softcard.

Stockboy is written in Microsoft BASIC, and is designed to be easily altered to suit your needs. It can be compiled using BASCOM if you desire. It is designed for use by non-technical operators.

Available for: CP/M and PC formats

\$29.95 most systems **\$34.95** for 8"

Ontario residents add 7% PST.

MDM730

MDM730 is one of the most powerful MODEM7 programs available. . . and the Computing Now! version of MDM730 incorporates features not available in the public domain editions. If you are into telecommunications, bulletin boards and downloading software your life will be full and meaningful with this code. For background on MDM730, see July 1984 Computing Now!. Consider the facilities.

- Terminal program which works at any baud rate.
- Ten programmable macro function keys.
- Thirty six number phone library.
- Christensen software transfer protocol.
- User settable toggles for line feeds, ON-XOFF and so on.
- Extensive help menus.
- Baud rate selection on the fly (or the spider).
- ASCII dump and capture.
- Status menu
- Many more features.

In addition to all this splendor, however, we've added dialing support for the Apple version. While the standard MDM730 cannot dial unless it's hooked to a Hayes Smartmodem, we've added patches to it to allow it to do pin twenty five pulse dialling and to dial through the Hayes Micromodem II and the SSM card. The Computing Now! MDM730 will also

- Select a number from the library and dial it
- Accept a hand entered number and dial it
- Wait for carrier
- Log you onto the remote system if it's free
- Optionally autodial if the remote board is busy.
- Count the number of attempts at dialling the remote BBS.

The Computing Now! MDM730 package is available for

- The Hayes Micromodem II.
- The SSM 300 Baud modem card.
- The PDA 232C serial card with external modem.

The PDA 232C package includes versions supporting both the Smartmodem and a dumb modem with pin twenty five line control, such as the Novation AutoCat. Also included with each package are utilities to permit easy alteration of the phone number library and the function key macro strings plus an extensive documentation file.

The source code file for this program is over a hundred and fifty kilobytes long. It cannot be hacked on a standard Apple. We patched it on a larger machine and downloaded it. As such, we're pretty sure that MDM730 with these features is unavailable elsewhere.

Available for: Apple II +
CP/M 2.2. systems
TRS-80 Model II (complete with
the above applicable features)

Please specify modem version
from above list. **\$29.95**

Ontario residents add 7% PST.

Fine Print:

The original MDM730 code is in the public domain. We are offering this part of the program without cost. The charges for this package are for the patches created by Computing Now! and to defer the cost of handling and postage.

This software is guaranteed to work correctly if properly applied. The serial cards on Apple and compatible systems must be installed in slot two with at least 48K of RAM running Microsoft CP/M 2.2. The PDA 232C version will require the availability of either a Hayes Smart-Modem or a modem with pin twenty five line control to dial. Users of the SSM card version may experience some difficulty in detecting extremely faint carriers on older versions of this card.

Formats

Where CP/M is shown, the following formats are available:

Apple II + CP/M (see below)
Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromenco*, Epson QX-10VD, Sanyo MBC1000, Nelma Persona, Kaypro II, Osborne Single Density*, Osborne Double Density, Systel/Olympia, 3R Avatar, Attache, Televideo, Lobo Max-80*, DEC VT-180, Casio FP-1000, Micromate, Zorba, 8 inch SSSD*

*Software marked with an asterisk is the higher price quoted.

MDM730 for the Apple II + CP/M requires two disks and is at the higher price.

PC

Available for the IBM PC and genuine compatibles.

AppleDOS

For Apple II+ and genuine compatible systems.

TRS-80 Model II CP/M

Will operate under either Lifeboat or Pickles and Trout CP/M.

Apple Wordstar Fixer

Apples and Wordstar are not entirely friendly. Apple compatible systems equipped with Videx type eighty-column cards do a number of unpleasant things to this popular word processor. While there are simple cures for this... they all involve some delicate code hacking.

The Fixer solves this problem. Place it on the same disk as your copy of WS.COM, type FIXER and after a suitable amount of disk noise version 3.0, you will have APWS.COM on there too. This version of Wordstar includes special patching and unhooking code which runs each time you boot Wordstar, and makes your fruit behave as it should. It releases the control K's, translates the left arrow key to a delete character, and patches Unitron keyboards.

In addition all of this, the fixer allows you to set some of the defaults of Wordstar which the MicroPro INSTALL Package doesn't really get to. All of these features are menu driven in English for absolute non-technical operation.

Fixed Wordstar will run in either 44K or 56K CP/M.

Available for: **\$19.95**
Apple II + CP/M only.

Ontario Residents add 7% P.S.T.

Steve's CP/M Wunderdisk! Volume the First

In the course of doing the last year or so of Computing Now! we've generated a lot of code. We've collected all the programs we've written... some of which have never been published in any of our magazines... and put 'em all on one disk. Included are things like STAR, the Gemini 10 printer setup, the Last Wordstar Unhook, CPMAP and the CP/M HOST program, complete with several unreleased support programs.

The Wunderdisk is the best collection of tricky CP/M routines on the planet, ideal for anyone who wants to get inside this powerful operating system and sing. It's also the best documented... the programs, for the most part, are written up in issues of Computing Now!

The Wunderdisk is available for: CP/M **\$19.95**

Ontario Residents add 7% PST.

Gemini WordStar PRESS

The WordStar printing function is agonizingly slow. It's also not very obliging in regards to where it puts its page numbers and things like headers.

PRESS is a utility which handles the formatted printing of all sorts of text files, be they manuscripts, drafts, program listings... anything that you'd normally want printed out in page form. It installs the header of your choice at the top of each page and slaps the page number beside it.

It also gives you a running count of the number of characters, lines and pages having hit the printer as you go. It allows you to have your documents printed out in a variety of type size and style permutations, commensurate with the capabilities of your printer.

Most important, however, PRESS will send text to your printer, formatted and all, as fast as your printer can accept it. It will even adjust the high bits of WordStar files to avoid selecting the Sanskrit character set.

PRESS comes configured for the Gemini 10X and 15X printers. It will, in fact, be quite happy with most Epson compatible dot matrix printers. A version is also supplied for use with letter quality daisy wheel printers.

PRESS is a simple to use package which communicates with you in plain English.

Available for: CP/M **\$19.95**

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Almost Free Software #1

Almost Free Software #2

Almost Free Software #3

Almost Free PC Software #1

Almost Free Software #1, #2 and #3 are for CP/M and are available in a variety of formats: Apple II + CP/M, 8 inch SSD*, Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromemco*, Epson QX-10VD, Sanyo MBC 1000, Nelma Persona, Kaypro II, Osborne Single* and double densities, Televideo, DEC VT-180, Casio FP-1000, Zorba.

*single density formats require two disks. The package cost for these formats is \$19.95

For IBM PC's and genuine compatibles. Available in Double-Sided or two Single-Sided Disks.*

Modem7. Allows you to communicate with any CP/M based system and download files. Complete details were in Computing Now! November 1983.

PACMAN. You can actually play PACMAN without graphics, and it works pretty fast.

FORTH. A complete up-to-date version of FIG FORTH, complete with its own internal DOS.

DUU. The ultimate disk utility allowing you to recover accidentally erased disk files, fix garbled files, rebuild and modify your system. A real gem.

D. A sorted directory program that tells you how big your files are and how much space is left on the disk.

USQ/SQ. Lets you compress and uncompress files. You can pack about 40% more stuff on a disk with this system.

Finance. A fairly sophisticated financial package written in easily understandable, modifiable Microsoft BASIC.

BADLIM. Ever had to throw out a disk with a single bad sector? This isolates bad sectors into an invisible file, making the rest of the disk useable.

DISK. Allows you to move whole masses of files from disk to disk without having to do every one by hand, you can also view and erase files with little typing.

QUEST. A "Dungeons and Dragons" type game.

STOCKS. This is a complete stock management program in BASIC.

SEE. Also known as TYPE17, will TYPE any file, squeezed or not allowing you to keep documents in compressed form while still being able to read them.

BISHOW. Th ultimate file typer, BISHOW version 3.1 will type squeezed or unsqueezed files and allow you to type files which are in libraries (see LU, below). However, it also pages in both directions, so if you miss something, you can back up and see it again.

LU. Every CP/M file takes up unnecessary overhead. If you want to store lots of data in a small space, you'll want LU, the library utility. It permits any number of individual files to be stored in one big file and cracked apart again.

RACQUEL. Everyone should have one printer picture in their disk collection.

MORTGAGE. This is a very fancy mortgage amortization program which will produce a variety of amortization tables.

NSBASIC. Large disk BASIC packages, such as MBASIC, are great... and very expensive. This one, however, is free... and every bit as powerful as many commercial programs. It's compatible with North Star BASIC, so you'll have no problem finding a manual for it.

Z80ASM. This is a complete assembler package which uses true Zilog Z80 mnemonics. It has a rich vocabulary of pseudo-ops and will allow you to use the full power of your Z80 based machine... much of which can't be handled by ASM or MAC.

VFILE Easily the ultimate disk utility, VFILE shows you a full screen presentation of what's on your disk and allows you to mass move and delete files using a two-dimensional cursor. It has heaps of features, a built-in help file and works extremely fast.

ROMAN. This is a silly little program which figures out Roman numerals for you. However, silly programs are so much fun...

CATCHUM. If you like the fast pace and incredible realism of Pacman, you'll go quietly insane over Catchum... which plays basically the same game using ASCII characters. Watch little "C's" gobble periods while you try to avoid the deadly "A's"... It's a scream.

OIL. This is an interesting simulation of the workings of the oil industry. It can be approached as either a game or a fairly sophisticated model.

CHESS. This program really does play a mean game of chess. It has an on-screen display of the board, a choice of colours and selectable levels of look ahead.

DEBUG. The DDT debugger is good but this offers heaps of facilities that DDT can't and does symbolic debugging... it's almost like being able to step, trace and disassemble through your source listing.

DU87. The older DUU program does have some limitations. This version overcomes them all and adds some valuable capacities. It will adapt itself to any system. You can search, map and dump disk sectors or files. It's invaluable in recovering damaged files, too.

ELIZA. This classic program is a micro computer head shrinker... It runs under MBASIC, and, with very little imagination, you will be able to believe that you are conversing with a real psychiatrist.

LADDER. This is... this program is weird. It's Donkey Kong in ASCII. It's fast, bizarre and good for hours of eye strain.

QUICKKEY. Programmable function keys allow you to hit one key to issue a multi-character command. This tiny utility allows you to define as many functions as you want using infrequently used control codes and to change them at any time... even from within another program.

RESOURCE. While a debugger will allow you to disassemble small bits of code easily enough, only a true text based disassembler can take a COM file and make source out of it again. This is one of the best ones available.

PCWRITE. While not quite Wordstar for nothing, this package comes extremely close to equalling the power of commercial word processors costing five or six bills. It has full screen editing, cursor movement with the cursor mover keypad, help screens and all the features of the expensive trolls.

SOLFE. This is a small BASIC program that plays baroque music. It's also a fabulous tutorial on how to use BASICA's sound statements.

PC-TALK. A Telecommunications package for the IBM PC which does file transfers in both ASCII dump and MODEM7/X-MODEM protocols and comes with... get this... 119424 bytes of documentation.

SD. This sorted directory program produces displays which are a lot more readable than those spewed out by typing DIR.

FORTH. This is a small FORTH in Microsoft BASIC. You can build on the primitives integral with the language.

LIFE. An implementation of the classic ecology game written in 8088 assembler.

MAGDALEN This is another BASIC music program.

CASHACC. This is a fairly sophisticated cash acquisition and limited accounting package written in BASIC. It isn't exactly BPI, but it's a lot less expensive.

DATAFILE. This is a simple data base manager written in... yes, trusty Microsoft BASIC.

UNWS. Wordstar has this unusual propensity for setting the high order bits on some of the characters in the files it creates. Here's a utility to strip the bits and "unWordstar" the text. The assembler source for this one is provided.

HOST2. This is a package including the BASIC source and a DOC file to allow users with Smart-Modems to access their PC's remotely. It's a hacker's delight.

Order as AFS #1
and specify system

Order as AFS #2
and specify system

Order as AFS #3
and specify system

Order as AFPCS #1
Specify Double-Sided or
2x Single-Sided.*

All of this software has been obtained from public access sources and is believed to be in the public domain. The prices of the disks defer the cost of reproducing them and mailing them, plus the cost of the medium. The software itself is offered without charge. A few items include messages imbedded in the code asking for voluntary donations on behalf of the authors.

Moorshead Publications warrants that the software is readable and if there are defects in the medium, we will replace it free of charge. While considerable effort has been made to ensure that programs are thoroughly debugged, we are unable to assist in adapting them for your own applications.

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**Somebody has to be better
than everybody else.**



*Warranty details inside package. Dysan is a registered trademark of Dysan Corporation.

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Dealer Inquiries Invited

article. However, in brief, a stepper motor is a D.C. motor with a shaft which rotates through precise angular increments for each control pulse received. It can, furthermore, move forward or reverse. By counting pulses, you decide how far the shaft and any connected pulleys move. Ray mounted a Superior Electric Model MO-93 stepper motor on each hand control of the lathe and milling machine. Now, not his hands but his stepping motors, under computer control, manipulate the work.

You could design your own board to control and motors but why bother? It's cheaper to buy a stock one. Superior Electric makes an excellent controller board. My only complaint with it is that it doesn't have optoisolators. Most stepper motors run at twenty four Volts D.C. with many spikes and other nasty computer destroyers. For this reason, I'd prefer an electrically isolated controller board. Connect the controller to the out-port that you designed earlier. Voila, your computer controls the controller.



As you send commands to your tool, how do you know whether or not it is receiving and executing them? Do you need to know? Stepper motors, as a rule, are sufficiently accurate that, if your software is sound, they'll do what they're told. Unfortunately, that Irish engineer, Murphy, keeps popping up.

Was that a glitch or a pulse on the wire? Your motor doesn't know. Who forgot to lubricate the handle? If the load is too heavy for the motor to move, a whole train of pulses will be lost. Stepper motors can't make up these lost pulses. It's wise, therefore, to have some method of knowing where the instrument actually is. In a no-feedback system, the tool must periodically return to a reference point and start over. This is inefficient if many operations are necessary but may work for simple applications. A more sophisticated approach is to have a backup measuring device.

In fact, Ray decided on two backup systems. The simplest and crudest employed limiting microswitches. He used a photo transistor and light source available in a single package. If the milling head or the cutting tool on the lathe moves beyond certain limits, it will break the light beam and the system resets itself. As the system was perfected, Bilsky decided that not only did he want to know when the tools went amok but also where they were when they were behaving.

To do this, Bilsky used Bausch and Lomb's optical ruler, the ACU-RITE+5.

This is a photoelectric device mounted on the milling machine which sends back to the computer a continuous plot of the movement of the milling table. If there's a difference between computed and actual positions, the program readjusts itself. This way, the milling machine maintains an accuracy within 0.0005 of an inch. As a bonus, we were later able to use the light rule and a sensing probe to map a template, store the results and later use this data to produce identical pieces.

Unfortunately, neither computer was fast enough to analyse the data from all three rulers simultaneously. Therefore, Ray built three 8080-based slave boards to co-process the data from these optional rulers and then pass it on to the host computer. Each board monitors either X, Y or Z axis as the machine works. Ray, understandably, would not provide me with the schematics and software of these controllers.

Future Additions

Are there any further refinements that could be incorporated into this system? Yes. Ray is in the process of installing an automatic tool changer on the milling machine. This allows changing the size and type of milling bit under software control, greatly enhancing versatility. Mechanically hooking up the changer, unfortunately, is much easier than writing control software. I expect it will take another month to get this addition running. Next will come an automatic feed for the lathe. Now it is necessary to manually advance the bar of metal whenever the tool rest reaches the lathe head. In the future, this will be done by the third stepping motor. Once again hardware changes are easier than software modifications.

If you run into problems with hooking up your own system, where can you turn? First, whether it be for stepper motor, controller board or I.C. chip, hunt up the hardware manufacturer's technical rep. These guys are ready, willing and eager to help you. After all, they're often tinkerers too. Next, visit every available trade fair. Huge companies such as Moog and all the Japanese engineering firms will proudly point out how they solved each problem, hoping to impress you with their R&D savvy. Milk them for all they're worth but remember, though, their stuff is patented. You can pick up their ideas for your own use but don't try selling them.

In summary, I have provided you with ideas on interfacing a specific tool to a microcomputer. I hope I have given you enough steps to let you develop your own system. Use your imagination and facilities to enter the world of robotics.

CNI

MODEM7 for the Macintosh



It may be a while before someone manages to dream up a suitable icon to represent it, but MODEM7 transfers are possible for Macintosh owners. Here's a shot at the code.

by Anthony DeBoer

While the Macintosh supports a serial port, as any reasonably civilized computer must, its capacities for driving it are limited at best. Even the serious programming documentation for the new fruit doesn't say anything more than it has to about this treacherous little interface.

As Macintosh applications become more diverse, however, many users will want to be able to move files to and from this unusual system. Pumping raw data over a hard wire link, or, worse still, over the phone lines, offers all sorts of physical laws infinite opportunity to corrupt it. Only by using a protocol transfer can one have a reasonable chance of getting out what one puts in.

Until now this was a difficult undertaking. The most common transfer protocol, MODEM7, was unavailable on the Macintosh, as was most of the rest of the software most other users take for granted. In this article, however, we are pleased to present

MODEM7 for the Macintosh, written in easily comprehensible Microsoft BASIC.

Ports and Things

Serial ports let computers talk to one another, or to various computer like objects such as printers. While the technical standards for these things are diverse and arcane, the basic idea is that there is a ground wire, a wire over which computer A sends data to computer B, and a wire over which computer B sends stuff back to A.

Further wires may be added to tell computer A that computer B doesn't want to talk right now because it's intently spinning its disk drives, but that's just icing on the cake.

The Mac's serial port, while a bit different from the ordinary RS-232 ports that most micros have, or could have, is still quite


```

10  -----
20  Macdem 7, modem program for Macintosh
30  -----
40  Copyright (c) 1984 Anthony DeBoer
50  -----
60  -----
70  GOTO 310
80  --- receive loop
90  G$=NAK$
100 PRINT "Awaiting";SECT
110 PRINT #1,G$;:WT=0
120 IF LOC(1)=0 THEN IF WT>500 THEN 100 ELSE
    WT=WT+1:GOTO 120
130 S$=INPUT$(1,1):IF S$=EOT$ THEN 270
140 IF S$<>SOH$ THEN PRINT "oops:";ASC(S$):
    G$=NAK$:GOTO 120
150 A$=INPUT$(131,1):RSN=ASC(A$): PRINT "
    Received";RSN
160 IF RSN<SECT THEN G$=ACK$:GOTO 100
170 IF RSN>SECT THEN PRINT "Fatal error":END
180 IF ASC(MID$(A$,2,1))<>255-RSN THEN PRINT
    "Sector # error":GOTO 90
190 CKS=ASC(RIGHT$(A$,1)):A$=MID$(A$,3,128):C=0
200 FOR I=1 TO 128:C=C+ASC(MID$(A$,I,1)):NEXT
210 IF (C AND 255)<>CKS THEN PRINT "Checksum
    error":GOTO 90
220 IF NOT TFLAG THEN 250
230 I=INSTR(A$,CHR$(26)):IF I THEN A$=LEFT$(A$,I-1)
240 I=INSTR(A$,CHR$(10)):IF I THEN A$=LEFT$(A$,I-
    1)+MID$(A$,I+1):GOTO 240
250 PRINT #2,A$;
260 SECT=SECT+1:G$=ACK$:GOTO 100
270 PRINT "Transfer complete"
280 CLOSE #2
290 PRINT #1,ACK$;
300 RETURN
310 --- initial setup
320 DEFINT A-Z:DIM CODE(68)
330 FOR I=1 TO 6:READ BDRATE(I),BDIV(I):NEXT:BAUD=1
340 DATA 300,&h17c, 600,&hbd, 1200,&h5e
350 DATA 2400,&h2e, 4800,&h16, 9600,&ha
360 FOR I=0 TO 5:READ A1$(I),B1$(I):NEXT
370 DATA Terminal,mode,Send,file,Receive,text
380 DATA Receive,binary,Help,,Quit,program
390 NAK$=CHR$(21):ACK$=CHR$(6):SOH$=CHR$(1):
    EOT$=CHR$(4)
400 --- main menu
410 CLS:CALL TEXTMODE(1)
420 FOR J=0 TO 11:GOSUB 920
430 CALL FRAMEROUNRECT(VARPTR(RECT(0)),10,10)
440 CALL MOVETO(X+3,Y+17)
450 IF J<6 THEN PRINT A1$(J); ELSE PRINT
    MID$(STR$(BDRATE(J-5)),2);
460 CALL MOVETO(X+3,Y+32)
470 IF J<6 THEN PRINT B1$(J); ELSE PRINT "Baud";
480 NEXT:CALL TEXTMODE(0)
490 CALL MOVETO(10,130):PRINT BDRATE(BAUD);"baud
    selected";
500 GOSUB 960
510 IF J>5 THEN BAUD=J-5:GOTO 490
520 CLS:PRINT A1$(J);" ";B1$(J);
530 IF J<4 THEN GOSUB 1030:PRINT " at";
    BDRATE(BAUD);"baud";
540 PRINT:PRINT:ON J GOTO 650,840,860,1180,1430
550 --- set up terminal mode
560 PRINT "Hit ";
570 CALL TEXTFONT(0):PRINT CHR$(17);:CALL
    TEXTFONT(1)
580 PRINT "E or click the mouse to return to
    menu":PRINT:A$=""
590 CALL TEXTFONT(4):CALL TEXTSIZE(9)
600 WHILE A$<>CHR$(5) AND MOUSE(0)<1:IF A$>"" THEN
    PRINT #1,A$;
610 IF LOC(1) THEN C=ASC(INPUT$(1,1)) AND 127:IF
    C<>10 THEN PRINT CHR$(C);

```

MODEM7 for the IBM PC



There are quite a number of telecommunications packages for the IBM PC, many of them supporting the MODEM7/XMODEM file transfer protocol. However, most of them are slow and a good number weird beyond human comprehension. The PC has a vast permutation of supershifts and function keys and it looks like the authors of these things were determined to use them all . . . along with the high resolution graphics, the sound and the joystick ports.

If you just want a simple terminal package to call boards and download software . . . or if you want to move files between systems without sweat . . . the tiny Martian in your soul is even now crying out for MODEM7 for the IBM PC.

Unlike the other packages, MODEM7 for the IBM PC works just like the original MODEM7 which has been used . . . and thoroughly debugged . . . for years under CP/M. It supports all the same commands, requiring virtually no time to learn, and operates flawlessly.

This version has been carefully patched to assure that it will run at high baud rates, should you want to port files between systems. It will also work properly on virtually all IBM compatible systems.

It operates through the COM1: serial port.

MODEM7 for the IBM PC is available for just

\$19.95

**Computing Now! Magazine
MODEM7 for the IBM PC
25 Overlea Boulevard, Suite 601
Toronto, Ontario
M4H 1B1**

Fine Print: Portions of this software are in the public domain. We are not charging for this code, but, rather for the patches and new code added to it and to defer the cost of the media.

While we have made every effort to assure that this software will function as it is intended to, we are unable to assist you in adapting it for unusual applications.

This software expects to find the base of the serial port at 03F8H.

MODEM7 for the Macintosh

```

620 A$=INKEY$:WEND
630 CALL TEXTFONT(1):CALL TEXTSIZE(12)
640 GOTO 400
650 '--- set up file send
660 INPUT "Enter name of file to send: ",F$:PRINT
670 OPEN "R",#2,F$
680 FIELD #2,128 AS A$
690 TS=(LOF(2)+127)\128:LZ=TS*128-LOF(2)
700 IF TS=0 THEN PRINT "Empty file - nothing to
    send":GOSUB 1400:GOTO 400
710 PRINT "Length of file =";TS;"sectors":PRINT
720 PRINT "Awaiting initial NAK":WHILE
    INPUT$(1,1)<>NAK$:WEND
730 FOR SECT=1 TO TS
740 GET #2,SECT
750 IF SECT=TS THEN A$=LEFT$(A$,128-LZ)+
    STRING$(LZ,CHR$(26))
760 SS=SECT AND 255:CKS=0:FOR I=1 TO 128:
    CKS=CKS+ASC(MID$(A$,I,1)):NEXT
770 PRINT "Sending";SECT
780 PRINT #1,SOH$;CHR$(SS);CHR$(255-SS);A$;
    CHR$(CKS AND 255);
790 G$=INPUT$(1,1):IF G$=NAK$ THEN 770
800 IF G$<>ACK$ THEN PRINT "Error: ";ASC(G$);
    "received":GOTO 770
810 NEXT:PRINT #1,EOT$;
820 CLOSE #2
830 PRINT "Transfer completed":GOSUB 1400:GOTO 400
840 '--- set up text receive
850 TFLAG=-1:GOTO 880
860 '--- set up binary receive
870 TFLAG=0
880 INPUT "Enter name of file to receive: ",F$
890 OPEN "O",#2,F$
900 SECT=1
910 GOSUB 80:GOTO 400
920 '--- generate box co-ordinates
930 IF J<6 THEN Y=10 ELSE Y=70
940 X=80*(J MOD 6)+10
950 RECT(0)=Y:RECT(1)=X:RECT(2)=Y+40:RECT(3)=X+60:
    RETURN
960 '--- mousetrap
970 WHILE MOUSE(0)<1:WEND
980 X=MOUSE(1):Y=MOUSE(2)
990 J=X\80:I=X MOD 80:IF J>5 OR I<10 OR I>70 THEN
    BEEP:GOTO 970
1000 IF Y>10 AND Y<50 THEN RETURN 'first row
1010 IF Y>70 AND Y<110 THEN J=J+6:RETURN 'second
    row
1020 BEEP:GOTO 970
1030 '--- initialize communications port
1040 ' this routine derived from Microsoft's
    terminal setup routine
1050 ' on the MS-BASIC distribution disk
1060 CLOSE 1
1070 OPEN "COM1:" AS 1
1080 RESTORE 1140
1090 FOR I=0 TO 26 : READ CODE(I) : NEXT I
1100 CODE(20)=0
1110 CODE(41) = &H4C00+ BDIV(BAUD)
1120 COMINI! = VARPTR(CODE(0)) : CALL COMINI!
1130 WHILE LOC(1):G$=INPUT$(1,1):WEND 'get rid of
    input garbage
1140 DATA 16890,52,12668,8,26,12668,-7,24,-24572
1150 DATA 12668,-6,24,-24572,12668,-6,24,12668,
    10,26
1160 DATA 8572,257,4371,28,17064,32,-24572,20085
1170 RETURN
1180 '--- help
1190 PRINT " Macdem 7 lets you communicate with
    other computers via the"
1200 PRINT "communications port on the back of the
    machine. With the main menu"
1210 PRINT "on the screen, click one of the bottom
    row of boxes to set a baud"
1220 PRINT "(bits per second) rate. 300 or

```

```

    sometimes 1200 are normal for phone"
1230 PRINT "communications. Next, click one of the
    first four top boxes to start"
1240 PRINT "communicating.":PRINT
1250 PRINT " In terminal mode, any key you hit
    gets sent to the other computer,"
1260 PRINT "and anything it sends shows up on the
    Mac's screen.":PRINT
1270 PRINT " The other three options let you send
    and receive files using the Ward"
1280 PRINT "Christensen MODEM7 protocol. This makes
    the two computers send"
1290 PRINT "checksums and so on back and forth to
    make sure the file arrives intact."
1300 GOSUB 1400:PRINT:PRINT
1310 PRINT " To use the send/receive options, the
    other computer must also support"
1320 PRINT "a version of MODEM7.":PRINT
1330 PRINT " The Receive Text option strips
    linefeeds and end-of-file markers that"
1340 PRINT "the Mac doesn't like from the incoming
    file.":PRINT
1350 PRINT " A final technical note, in case you
    want to make your own cable to"
1360 PRINT "connect Mac to another computer's RS-
    232 port: On the 9-pin serial"
1370 PRINT "connector, pin 1 is ground, pin 5 is
    outgoing data, and pin 9 is"
1380 PRINT "incoming data."
1390 GOSUB 1400:GOTO 400
1400 '--- page end
1410 PRINT:PRINT TAB(35);"Hit a key or click the
    mouse...";
1420 WHILE MOUSE(0)<1 AND INKEY$="":WEND:CLS:RETURN
1430 END

```

capable of communicating with other computers either directly or over the phone lines via a modem.

The first requirement to get it talking, then, is a cable to connect Mac to whatever you want to connect Mac to. On Mac's backside is a nine pin connector with a picture of a phone handset and a few ones and zeros. That's the serial port. A standard male DB-9 connector that you can pick up anywhere, or in other words at Radio Shack, will fit here nicely.

Pin one (there are tiny little almost-invisible numbers on the things) is the aforementioned ground, pin five is the one via which Mac talks to the outside world, and pin nine is the one that Mac listens to. The others can safely be left unconnected.

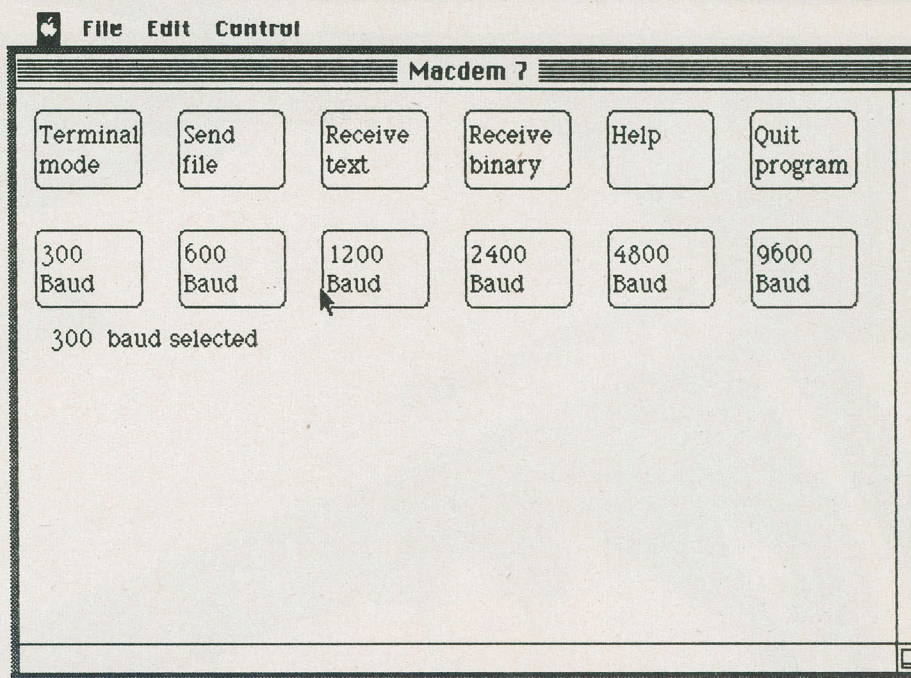
Whatever you decide to connect Mac to will probably want a DB-25 connector. On these, pin seven is always ground, while pins two and three are outgoing and incoming data, not necessarily in that order. Check the other machine's manual to be sure.

Mac's serial port is rumoured to be more sensitive than most to short circuits and other such electronic violences. We were careful, and encountered no problems. However, it does pay to take care.

Talking Icons

The other thing you need to see the outside world from inside Mac is an icon on the screen that talks to the serial port. The MODEM7 program, presented with this article, is an example of such a thing.

The program is written in Microsoft MS-BASIC, implying that you need a copy of this if you want the program to work. Although Microsoft includes a terminal program on the MS-BASIC disk, MODEM7 is written to do a few things that their program doesn't.



The main menu screen of MODEM7 for The Mac.

Once you get MODEM7 up and running, you will be presented with twelve options. Somewhere around here is a picture of Mac's screen with these option boxes.

The ones in the lower row set the baud rate. If you're communicating directly with another computer nearby, you can get away with the higher speeds, but telecommunication via phone lines limits you to 300 or sometimes 1200 baud. Just click the mouse on the box you want, and the speed will be set.

The upper row of boxes choose the main program options. Terminal mode lets you type away at a another computer and see what it's typing back, while the send and receive file options let you transfer whole files between computers. The help option prints a few crib notes on the screen. The quit option does what quit options normally do.

File sending and receiving is done with the MODEM7 protocol, something that was developed for CP/M machines eons ago by Ward Christensen. This lets computers transmit files back and forth without risking the killing of the file by transmission glitches or by the receiving computer not being able to handle the transmission quickly enough. The two computers send codes and checksums back and forth, and if anything is corrupted it gets sent again until they get it right.

In either mode, the program will ask for the name of the file to be sent or received, and will proceed onwards to do its thing. The computer at the other end of the line should hopefully be doing the opposite operation at the same time. If all goes well, it will patiently handle one 128 byte block, or CP/M logical sector, at a time.

If anything goes wrong, there is always the stop option on one of Mac's pull down menus.

The file receive operation is broken down into two options. The second, binary receive, accepts the file exactly as it comes in. The text receive cleans up the file a bit before storing it on the disk, taking out linefeeds and end of file characters that Mac doesn't want.

The structure of MODEM7 for the Mac is fairly straightfor-

ward. It puts up several round-cornered boxes with text in them and then goes to a mousetrap routine to see where the mouse will come down. Once it does, it either changes the baud rate or goes one of six ways to do what you told it to.

Note that the file receive routine is at the beginning of the program. This is because when you GOTO in BASIC, it has to search for the line number. It will find it more quickly if it's near the beginning of the program. Thus, code that has to be quick on its feet should be near the front, and something that can afford to be slow, like the online help routine, can be at the end.

Much of the program will look familiar to programmers of MS-DOS GW-BASIC or even CP/M MBASIC-80, which is not surprising, since they are all variations on the same theme from Microsoft. The main differences are the MOUSE function, the internal Macintosh routines like FRAMEROUNDRECT and TEXTMODE and some details of the serial communications port driver. The subroutine in line 1030 has to set up a small subroutine in 68000 machine code to set up the port.

Macintalking

Once you have all this set up you should be able to call various dial up information services, if you have a modem, or to talk to your other computers, if that's what you have in mind.

Files that you receive may need a bit of reworking. The file's icon will initially not be recognised by Mac's file finder as a MacWrite or MS-BASIC or whatever document, so you can't launch directly into it. You need to run the appropriate application, drag it in and then save it again to tell the finder which application it belongs to.

Similarly, some applications save additional information with files that other computers might not understand. A MacWrite document contains information about rulers, line spacing, and the occasional picture if you put any in. MS-BASIC likes to save files in a compressed binary format. If you plan to send a file to another computer, save it in the text only or ASCII mode first. **CN!**

Roland MPU401 Review



As computer music systems have become more sophisticated, predominately with the introduction of the MIDI bus, microcomputers have slipped gracefully out of the role of player and into that of conductor. Here's a look at an IBM PC based package which hosts one of the most sophisticated conductors going.

by Steve Rimmer

The potential of the MIDI computer music bus, along with the supreme virtuosity of some of the MIDI based sound hardware that's been happening of late makes the possibility of extending the workings of one's fingers through the computer decidedly less remote than it ever has been. While computer music has been a reality for some time, especially through the more sophisticated systems like the

Synclavier and the Fairlight, it has always been extremely expensive and, despite the flexibility of some of these systems, still very finite in its scope.

On top of this, you had to take a year off to read the manuals and figure out how all the packing cartons came apart.

The MIDI based systems transcend this to a large degree by virtue of the bus... if your present box peters out you can add some more boxes to the band and keep playing. The boxes are good and getting better, the bus has lots of headroom in its design and the computers that are around for controlling the whole works are more than up to the task... well, sort of.

The weak link has been the software and, to a lesser degree, the computer interfaces which made the MIDI bus accessible to undedicated micros.

The Roland MPU 401 is, perhaps, the first microcomputer interface system which really promises to uncap a reasonable measure of the potential of MIDI and microcomputers. It combines a really powerful intelligent bus communications system and some cleverly written software to make the MIDI bus happy with an IBM PC.

Polyphonic Beeps

While there are a lot of part numbers involved in a complete Roland interface hardware and software system, the whole works generally gets called an MPU 401. In fact, this consists of four things, to wit, the MPU-401 itself... a white box with an out-break of plugs... an IBM PC style interface card, a connector cable and a disk with some software on it.

It's probably worth looking at the box first. Most MIDI based things that have to do with computers are *dumb*, in that they are driven by the processor of the system they live in. This has some advantages, in that it makes the hardware easily programmable and it makes it cheap and simple. However, it also eats system overhead.

Real time music actually takes quite a lot of system overhead, and blasting out multiple voices of sound can pretty well completely occupy even a relatively fast processor. It is not surprising, then, that MIDI packages using dumb interfaces usually have less power... typically fewer voices... than the bus specification allows for.

The Roland system is actually a separate dedicated computer. The MPU

401 box has its own processor, sucking only power and data from the host computer. As such, the IBM that's driving it can spit some instructions at it and then go on to do other tasks.

This is the first neat bit about the whole works. It can do most of what MIDI is capable of and, more to the point, can do it with enough system overhead left to handle other tasks, or at least other aspects of music processing.

The MPU 401 processor box takes the signals from the IBM interface card... it looks like a serial port but it's not... and makes them into real time MIDI codes. Likewise, it buffers the MIDI stuff on the bus, inhaling the bits that are pertinent to itself, and passes it along to the PC. This, amongst other things, allows the processor to only deal with the data that's pertinent to it, rather than its having to keep an eye on the bus virtually all the time.

As we got into in the December 1984 edition of *Computing Now!*, the MIDI bus itself transcends individual manufacturers, being an agreed upon standard like the

RS-232C interface. As such, the MPU-401 can be used equally well with other MIDI hardware that isn't made by Roland. I used it with a Yamaha DX-7... the box doesn't care what it's hooked to, providing it acts like a MIDI device.

Softly Now

In fact, despite the obvious technological profundity of the MPU hardware, it is the software that comes with it that really makes it leap to its rhinestone encrusted feet and boogie like a wired car sales-dwarf. The MPU401 program turns the IBM into the sequencer of the gods.

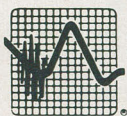
In using analog synthesizers the sequencer function is usually considered to be a fairly esoteric thing. This isn't inherent in sequencers per se, but, rather, in the limitations of the sorts of sequencers one finds in analog systems.

The sequencer function of the MPU package is a world away from those old banks of pots and gates. It is more of a real time multi-track tape recorder, a digital recording studio in which each of the se-

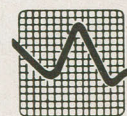
quence tracks can be dubbed separately.

The MPU system behaves very much like an eight track recorder which plays back through a MIDI sound generator... or a collection of them, should you be suitably loaded. In its simplest sense, one can lay down a track, figuratively wind back the virtual tape and lay down a second track while checking out the first. There are all the things that computer music systems usually do for one in this sense, such as producing a metronome click... through a speaker built into the MPU-401, in fact... and keeping a running count of the time into the recording.

Having played some music into the MPU software the file which holds the MIDI codes for what you've played can be saved to the disk. As such, music can be treated like text in a word processor. It's quite practical to treat the disk as a phonograph record and the computer and synthesizers as a stereo... albeit an expensive one. The sound of the Roland MPU401 and, in my case, the Yamaha DX-7, rivals that of any sound system. It's a bit like playing back your stuff through a live orchestra.



CAN YOU AFFORD NOT TO PROTECT YOUR COMPUTER?



POWER-PROBLEMS
are estimated to cause up to
90% of all computer and
word processor malfunctions

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constitutes the greatest
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Vancouver — Power Protection Systems Group

Roland MPU401 Review

If this was all the package did it would be pretty powerful. However, because the MIDI music is actually held as digital instructions to the computers of the MIDI instruments, rather than as analog signals or as digital representations thereof, it's possible to lay some additional transformations on them.

The simplest things the MPU package allows one to do with the sound its holding is to change its playback speed. This is pretty straight up... one simply adjusts the rate at which the notes are fed to the interface.

The eight tracks of the MPU "recorder" are assignable to eight unique MIDI channels if need be. This may take a moment of expalnation. My DX-7 is set up to behave as channel one, that is, it will play music which is blasted out on the MIDI bus with channel one as its destination address. Sadly, the bank would not take a fifth mortgage on the cat and, as such, I only have one DX-7. If I had more of them... and a bigger place to put them... I could have a second one hung on channel two, another on three and so on.

In this fairly simple example, I might set up the first DX-7 to play brass and the second one to play piano. These aren't terribly inspired sounding voices, I know. I could then assign track one of the recorder, for example, to channel two of the MIDI bus so that track one would play back as a piano.

The tracks, as such, can be individual instruments. However, because of the flexibility of the sound producing hardware itself any track can be reproduced as just about any instrument.

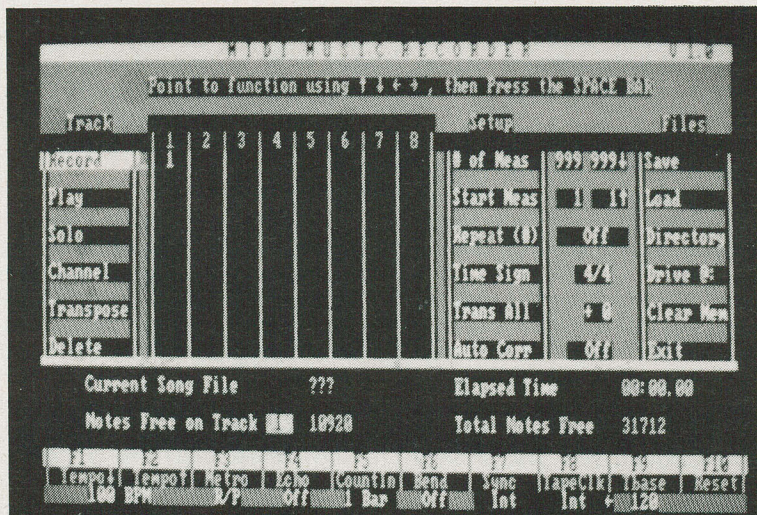
In addition to this, the software allows the individual tracks to be manipulated in a number of ways. One can, for example, transpose a track in software up to four octaves in either direction. The system also allows for the creation of loop tracks, that is, bits of music which repeat over and over again, such as for a background pattern.

This last bit can be unspeakably gross when used to excess, producing the popular "Talking Heads Tangerine Dream with a dash of Bowie only when I laugh" effect.

Repeating bits can repeat forever or just repeat a certain number of times and then move on.

The system allows one to select the time signature a piece is to be played in. If you want to be uncivil about it you can play something in 4/4 time and then select something a bit more refined after the fact.

Perhaps the most splendid of all the features of the system... especially for players that get a bit sloppy from time to



The main display of the system, showing the status of the eight tracks.

time... is the auto correction feature. This works analogously to the *snap* feature of many CAD packages. It takes your keyboard data, which is entered in "free time" and adjusts it so the keystrokes fall on the nearest integral beats. There are a number of meters and steps of resolution from which one can choose.

While this sounds like a fix for bad pianists, it is something worth using in most applications. If all the notes happen just when they should it shuts up and doesn't do anything. However, it can save you from that one burp that would otherwise cause the track to want doing over.

The auto correction routine works phenomenally well, making sense of even deliberately bad playing. What's more, it's pretty good at sensing the difference between variations and errors... it corrects one's gaffs without making the whole affair sound mechanical.

Indulgence and Indiscipline

The Roland system is the most impressive MIDI microcomputer package extant at the moment. It handles everything really smoothly, and offers features which couldn't have been had on a microcomputer based music system a year ago without getting into some star chamber bank loans.

It's probably still fair to say that the PC can't control the MIDI bus to its full extent... the task still wants more overhead than the system can provide. However, under the Roland package it can certainly handle the works to the extent which most musicians would want to take it.

Beyond this one can consider the possibility of cranial implants into a room full of fiddle and horn players, producing true



Specs

Package:	Roland MPU 401
Application:	Computer music MIDI controller
System:	IBM PC with 128K or better
Manufacturer:	Roland Canada Music Limited
Distributor:	Remenyi House of Music, 210 Bloor Street West, Toronto, Ontario M5S 1T8 (416) 961-3111
Price:	\$350.00, or \$595.00 with interface and software .

polyphonic orchestral sound with no fixed number of voices... all under computer control. However, this, in turn brings up serious interfacing concerns and the need to feed all the peripherals.

Sigh... technology is always full of tradeoffs.

There are a few advanced pertinent details in considering the MPU system. For example, it will handle about seven thousand notes with a hundred and twenty-eight K of RAM, or about thirty one thousand with a quarter megabyte... a lot of that first chunk is swallowed by the software itself.

The package will produce an external clock to synchronize a tape recorder. Thus, one can use the system with other, non-MIDI instruments by dubbing onto tape, or... with some effort... expand beyond the eight tracks the system provides. **CNI**

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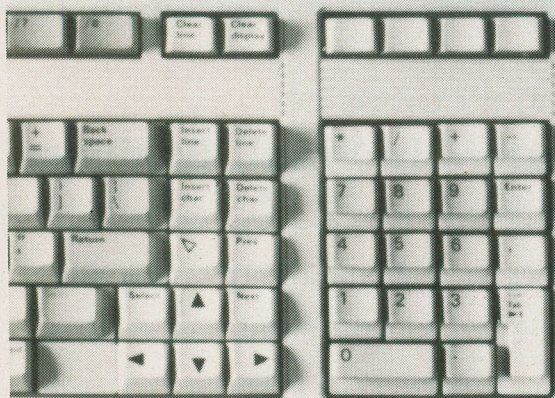
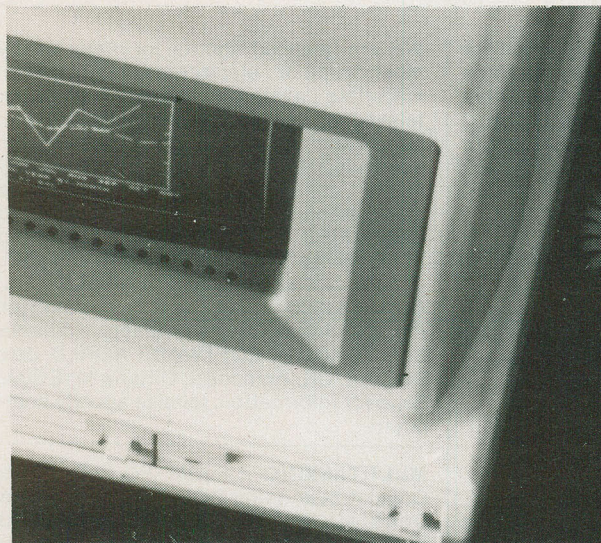
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Modem Survey



You may think that your micro enjoys your company, and well it might, but deep down in its silicon circuitry it yearns for some low-level conversation with its own kind. Surveyed below are a number of modems that will enable your lonely micro to become the talk of the town.

Password

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: A compact, stand alone modem featuring programmable autodial/answer capability, auto-mode and auto-speed select, audio phone line monitor and DTR override.

Suggested Retail: \$632.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Networker

Speed(s): 110 or 300 baud

Computer(s): Apple II, II+, IIe

Description: A plug-in, direct-connect card for Apple computers with full or half duplex, originate and answer, on-screen carrier detect. Comes bundled with supporting software.

Suggested Retail: \$219.00

Manufacturer: Zoom Telephonics

Distributor: TEO Computers and Peripherals Inc.

Phone Link

Speed(s): 0 to 300 baud

Computer(s): Any RS-232C equipped computer

Description: A compact, acoustic modem with status LEDs, manual originate and answer, and full or half duplex modes.

Suggested Retail: \$266.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Micro Link 300

Speed(s): Up to 300 baud

Computer(s): Any RS-232C equipped computer

Description: A direct-connect stand alone modem with manual originate/answer, analog loopback self testing and DTR override.

Suggested Retail: \$336.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Auto Link 300

Speed(s): Up to 300 baud

Computer(s): Any RS-232C equipped computer

Description: Same as the Micro Link 300, but also offers auto answer.

Suggested Retail: \$379.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Micro Link 1200

Speed(s): 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone modem supporting manual dial/answer/originate. Features analog loopback self test and DTR override.

Suggested Retail: \$632.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

S-100 Modem

Speed(s): 0 to 300, 1200 baud

Computer(s): Any S-100 bus based computer

Description: Similar to the Password, but featuring an S-100 bus.

Suggested Retail: \$632.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Auto Link 1200

Speed(s): 1200 baud

Computer(s): Any RS-232C equipped computer

Description: This stand alone modem provides manual originate, automatic or manual answer, full diagnostics and switch-selectable options.

Suggested Retail: \$702.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Auto Dial 212A

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone modem with programmable autodialling and answering, manual originate, manual answer (if desired). Has self testing, switch selectable options and audio phone line monitor.

Suggested Retail: \$842.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

Auto Link 212A

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone unit is similar to the Auto Dial 212A, but lacks autodialling and audio phone line monitor.

Suggested Retail: \$772.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

IBM PC Modem

Speed(s): 0 to 300, 1200 baud

Computer(s): IBM PC or PC/XT

Description: Plug-in PC card features are similar to those of Auto Dial 212A, less the self testing mode. The modem includes a real-time clock, a lithium battery, and on-board memory, though.

Suggested Retail: \$632.00

Manufacturer: U.S. Robotics, Inc.

Distributor: Amies Inc.

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Modem Survey

Canadiana 212A

Speed(s): 300 or 1200 baud

Computer(s): Any RS-232C equipped computer

Description: A stand alone modem featuring autodial/answer, menu-driven setup, auto-speed and auto-parity select, a repository dialler, storage of up to ten phone numbers, and built-in battery back up.

Suggested Retail: \$599.00

Manufacturer: Switchcom Manufacturing Inc.

Distributor: Switchcom Manufacturing Inc.

Canadiana 212AH

Speed(s): 300 or 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Similar features as the 212A, but also completely Hayes compatible, allowing use of popular terminal programs such as Crosstalk, Smartcom and Relay.

Suggested Retail: \$649.00

Manufacturer: SwitchCom Manufacturing Inc.

Distributor: SwitchCom Manufacturing Inc.

Canadiana 212A-PC

Speed(s): 300 or 1200 baud

Computer(s): IBM PC or PC/XT

Description: A plug-in board for the IBM PC and true compatibles that provides both the features of the 212A model and the added Hayes compatibility of the 212AH modem in an interior modem. All Canadiana modems have the same features, though the 212A is not Hayes compatible.

Suggested Retail: \$599.00

Manufacturer: SwitchCom Manufacturing Inc.

Distributor: SwitchCom Manufacturing Inc.

Acoustic Coupler AC-3

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: Acoustic modem provides full and half duplex, manually switched answer/originate modes.

Suggested Retail: \$199.00

Manufacturer: Tandy Electronics Limited

Distributor: Local Radio Shack stores

Maxwell 1200V

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Direct-connect stand alone modem with Racal-Vadic and Hayes software dialling protocols, touch-tone or pulse autodialling, line status detection and full diagnostics capability.

Suggested Retail: \$749.00 (2400 baud version available under \$1300.00)

Manufacturer: Racal-Vadic

Distributor: C.G.E. Data Systems

Maxwell 1200PC

Speed(s): 0 to 300, 1200 baud

Computer(s): IBM PC, AT, Portable or PC/XT

Description: Similar to the 1200V, but a plug-in card for IBM computers. Includes 'George', a software utility allowing autodial, unattended operation, file transfers using XMODEM protocol, and includes an editor. George requires 128K memory and runs under PC-DOS.

Suggested Retail: \$719.00 (2400 baud version available under \$1200.00)

Manufacturer: Racal-Vadic

Distributor: C.G.E. Data Systems

Racal-Vadic 212TA

Speed(s): 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: A stand alone, direct-connect modem featuring synchronous operation, manual originate, auto or manual answer, and an integrated dialler with auto-dial option.

Suggested Retail: \$995.00

Manufacturer: Racal-Vadic

Distributor: C.G.E. Data Systems

Racal-Vadic 212LC

Speed(s): 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Features of this direct-connect stand alone modem include manual originate and manual or auto-answer.

Suggested Retail: \$595.00

Manufacturer: Racal-Vadic

Distributor: C.G.E. Data Systems

Modem I

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: Direct connect, full and half duplex with manual switching between originate and answer modes.

Suggested Retail: \$149.00

Manufacturer: Tandy Electronics Limited

Distributor: Local Radio Shack stores

Modem II

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: Fully programmable direct connect stand alone modem offers autodial and auto answer, full or half duplex, remote and local test modes and auto-disconnect.

Suggested Retail: \$299.00

Manufacturer: Tandy Electronics Limited

Distributor: Local Radio Shack stores

DC 2212 Modem

Speed(s): 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone direct connect modem features autodialling, auto-answer, auto-disconnect, auto-speed select, and offers menu-driven operation.

Suggested Retail: \$599.00

Manufacturer: Tandy Electronics Limited

Distributor: Local Radio Shack stores

J-Cat

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: Compact direct connect modem provides auto-answer/originate. Manual disconnect and test mode.

Suggested Retail: \$251.22

Manufacturer: Novation, Inc.

Distributor: Frantek

103 Smart-Cat

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone direct connect modem with built-in dialler, redial on busy signal, auto answer, and extensive software command set.

Suggested Retail: \$419.76

Manufacturer: Novation, Inc.

Distributor: Frantek

103/212 Smart-Cat

Speed(s): 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Same as the 103 Smart-Cat, but also offers 1200 baud operation.

Suggested Retail: \$1001.70

Manufacturer: Novation, Inc.

Distributor: Frantek

212 Auto-Cat

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Similar to the 300/212 Smart-Cat, but also features auto-speed selection and both synchronous and asynchronous operation.

Suggested Retail: N/A

Manufacturer: Novation, Inc.

Distributor: Local dealers

Apple-Cat II

Speed(s): 0 to 300 baud

Computer(s): Apple II, II+, IIe

Description: Plug-in modem for Apple computers which, with accompanying Com-Ware software, provides phone directory with auto configuration, auto-dial, redial, answer and disconnect. Various options are available.

Suggested Retail: \$654.43

Manufacturer: Novation, Inc.

Distributor: Frantek

212 Apple-Cat System

Speed(s): Up to 1200 baud

Computer(s): Apple II, II+, IIe

Description: Two plug-in cards with Com-Ware software. Similar to Apple-Cat II, but with 1200 baud capability.

Suggested Retail: \$1219.00

Manufacturer: Novation, Inc.

Distributor: Frantek

Acoustic-Cat

Speed(s): 300 baud

Computer(s): Any RS-232C equipped computer

Description: A low profile, stand alone acoustic modem with manually selected answer or originate and full or half duplex. Self test mode.

Suggested Retail: \$385.84

Manufacturer: Novation, Inc.

Distributor: Frantek

Rixon 212A Executive

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Similar to the 212A Intelligent modem, but also offers status LEDs and a speaker with volume control.

Suggested Retail: \$899.00

Manufacturer: Case Rixon

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Modem Survey

Rixon 103J

Speed(s): 0 to 300 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone, direct-connect. Asynchronous operation. Features include a self-test mode, data/voice switch, loss of carrier disconnect timer and manual originate and answer.

Suggested Retail: \$370.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Rixon T202S

Speed(s): Up to 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone, direct connect. Asynchronous operation. Included features are remote test, local test and analog loop-back switches, half duplex operation and manual or auto originate/answer.

Suggested Retail: \$879.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Rixon 212A Intelligent

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Direct-connect, stand alone. Offers full duplex operation, auto-dial/answer, Hayes compatibility. Either touch-tone or pulse dialling. Compatible with Crosstalk software. Memory in modem is battery protected.

Suggested Retail: \$859.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Rixon 1224

Speed(s): 0 to 300, 1200 to 2400 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone, direct-connect. Features synchronous or asynchronous operation, full duplex, auto-answer, auto-dial, auto or manual originate. Compatible with CCITT V.22 Recommendation. Either touch-tone or pulse dialling.

Suggested Retail: \$1200.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Rixon 201C

Speed(s): 2400 baud

Computer(s): Any RS-232C equipped computer

Description: Stand alone, direct-connect. Included features are analog loopback and data/voice switches, status LEDs, half duplex (or full under private line), auto-dial, auto-answer. Touch-tone and pulse dialling supported.

Suggested Retail: \$1149.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Rixon PC212A

Speed(s): 0 to 300, 1200 baud

Computer(s): IBM PC or PC/XT

Description: Plug-in card for IBM computers. Features auto-dial, auto-answer, 1 to 10x redial of a given number, parity select, optional Hayes Smartmodem commands. Modem memory is protected with battery backup.

Suggested Retail: \$849.00

Manufacturer: Case Rixon

Distributor: Case Rixon

Modemcard

Speed(s): 0 to 300 baud

Computer(s): Apple II, II+, IIe

Description: Plug-in card for Apple computers including a built-in terminal program, Hayes Micromodem software compatibility, auto-dial, auto-answer. Either touch-tone or pulse dialling.

Suggested Retail: \$471.05

Manufacturer: Transend Corporation

Distributor: Frantek

Transmodem 1200

Speed(s): 0 to 300, 1200

Computer(s): Any RS-232C equipped computer

Description: Stand alone, direct-connect unit featuring synchronous operation, full duplex, auto-dialling, auto-answer.

Suggested Retail: \$1261.75

Manufacturer: Transend Corporation

Distributor: Frantek

PC Modemcard 1200

Speed(s): 0 to 300, 1200 baud

Computer(s): IBM PC or PC/XT

Description: Plug-in card for IBM computers provides both auto-dial and auto-answer. Command compatibility with Hayes and Racal-Vadic modems. Dials in either touch-tone or pulse.

Suggested Retail: \$989.21

Manufacturer: Transend Corporation

Distributor: Frantek

Micromodem IIe

Speed(s): 110 or 300 baud

Computer(s): Apple IIe

Description: A direct-connect plug-in board for the IIe with an on-board speaker, touch tone or pulse dialling, auto answer/originate, terminal program in ROM. Smartcom I software accompanies purchase.

Suggested Retail: \$499.00

Manufacturer: Hayes Microcomputer Products, Inc.

Distributor: Micron Distributing

Smartmodem 300

Speed(s): Up to 300 baud

Computer(s): Any RS-232C equipped computer

Description: A stand alone direct-connect modem featuring touch tone or pulse dialling, built-in speaker, auto-answer and auto-dial, indicator LEDs, last number redial and self testing.

Suggested Retail: \$469.00

Manufacturer: Hayes Microcomputer Products, Inc.

Distributor: Micron Distributing

Smartmodem 1200B

Speed(s): Up to 1200 baud

Computer(s): IBM PC, PC/XT

Description: A plug-in direct-connect modem with a built-in speaker, volume control, telephone cable and Smartcom II software. Choice of touch-tone or pulse dialling. Automatic speed selection on incoming and outgoing calls. Auto-answer, auto-dial.

Suggested Retail: \$949.00

Manufacturer: Hayes Microcomputer Products, Inc.

Distributor: Micron Distributing

Smartmodem 1200

Speed(s): Up to 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Direct-connect stand alone modem. Speaker with volume control. Allows touch-tone and pulse dialling. Has 40 character command buffer, auto-dial, auto-answer, automatic speed selection, indicator LEDs and a self-test mode.

Suggested Retail: \$1099.00

Manufacturer: Hayes Microcomputer Products, Inc.

Distributor: Micron Distributing

The Chronograph

Speed(s): N/A

Computer(s): Any RS-232C equipped computer

Description: A calendar/clock for precise timekeeping that can be used for off-hours 'batch' file transfers.

Suggested Retail: \$399.00

Manufacturer: Hayes Microcomputer Products, Inc.

Distributor: Micron Distributing

EMP Manual Mini Modem

Speed(s): Up to 300 baud

Computer(s): Any RS-232C equipped computer

Description: A stand alone modem offering manual switching between originate and answer mode. Status lights to indicate which mode (answer/originate) is active.

Suggested Retail: \$99.00

Manufacturer: Elec and Eltek Company Ltd.

Distributor: TEO Computers and Peripherals Inc.

EMP Auto Answer Mini Modem

Speed(s): Up to 300 baud

Computer(s): Any RS-232C equipped computer

Description: Similar to the Manual Mini Modem, but offers auto-answer, enabling equipped computer to operate (with appropriate software) as a host system.

Suggested Retail: \$145.00

Manufacturer: Elec and Eltek Company Ltd.

Distributor: TEO Computers and Peripherals Inc.

EMP Auto 1200A

Speed(s): 0 to 300, 1200 baud

Computer(s): Any RS-232C equipped computer

Description: Features full duplex automatic/manual originate, answer and disconnect. Pushbutton switching between data/voice and 300/1200 baud. Keyboard control built-in serial auto pulse dialler. Eight LEDs indicate line status.

Suggested Retail: \$539.00

Manufacturer: Elec and Eltek Company Ltd.

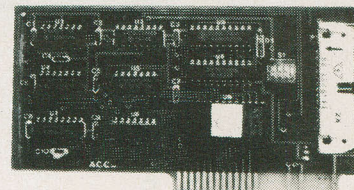
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Blort! for the Apple

- RVDZINSKI Δ

Arcade games for the Apple computer are plentiful, to be sure, but the majority of them retail for about the cost of a small household appliance or two. Here's one that's fast, frenzied, and best of all... free.

by John Rudzinski

I had a Vic 20 once... I freely admit it. Graphically, its strong points were its simple dot-addressable graphics and its sequential screen mapping. In retrospect, that's about the best I can say for it.

I learned 6502 assembler on the Vic 20 and sat down to write a game for it. *Blort!*, a 5K graphics-intensive program emulating both Sea Wolf and Scramble arcade games was about two-thirds finished when I sold the Vic to purchase an Apple clone. The tape I saved it on two years ago has some relaxing Genesis tunes on it now.

The Apple differs somewhat remarkably from the Vic 20. While its advantages are obvious, its screen handling is downright peculiar. The Apple's high resolution screens are not easily handled, and, discouraged, I gave up even considering writing a game for it.

This defeatist view changed recently when I had the opportunity to play a game on our typesetting machine... they make 'em for *everything* these days. This particular game was for the most part written by Steve, and scared the bejabbers out of the typesetter when she came in one morning to see the characters flitting across the machine's screen.

The game used the CompuGraphic's inherent text characters to represent an alien ship, the munitions and the player's ship. Once the player got interested in the game's intricacies, the obvious lack of high resolution was forgotten in favour of shooting down the aliens. Duly impressed, I decided to develop something similar for the Apple.

Drunken Astronauts

The scenario behind *Blort!* is as follows. After a wild drunken party at the officer's mess, a plastered comrade-in-arms bets you that you can't take NASA's latest space shuttle out for a few orbits and be back before the general notices your absence. Similarly plastered, you accept the challenge. You discover simultaneously upon ignition, however, that your friend has smothered the entire launching pad with axle grease, and that your ship has no brakes.

Worse, there're UFOs flying above you.

While you seem to be sliding uncontrollably back and forth between two invisible boundaries, you are afforded some control with the Z and X keys, allowing you to change your direction left or right respectively. Smacking your console's space bar hurls a missile at the annoying aliens overhead. Jabbing the ESCape key allows you to terminate your joyride and do unspeakable injuries to your drunken buddy.

Level one is a simple one. Two aliens, an inverse percent sign and an asterisk, bother you individually until your missiles make contact. The aliens are harmless in both levels, being observers sent to see what's doing with NASA's space program. Wait 'til Galactic Control hears about your popping them out of the sky like helium filled balloons...

Things pick up in the second level, including speed. Moreover, you discover that the friend who has recently become your worst enemy has rigged up a landmine dispenser smack in the middle of the launching pad. Hitting the A key will detonate a landmine... so will running into it, though you'll lose one of your three ships if you take this easy way out.

Again, these level two aliens are harmless, but you don't get any points if you don't hit them. The successful completion of level two brings back level one for an encore performance.

Code Blue

Blort! wasn't easy to write. It was entirely re-written when I gave up on the first iteration, which had aliens dancing all over creation. Debugging's fun, but our deadline was approaching. As with most games, the majority of the code relates to screen addressing.

While the Apple's high resolution addressing is at best insane, its text addressing is at least partially understandable. The screen is broken up into three sections which have to be carefully monitored if something, like a missile, is intended to cross a boundary into another section. While it's normally only necessary to subtract #80 from a missile's location when moving up a line, boundary crossings require a sixteen-bit addition of \$358. As the aliens and the player's ship only move one place either left or right at a time, their locations need only be decremented or incremented by one.

The main body of the code is comprised of the four repeating subroutines KEY?, SHOT?, ALIEN? and MINE?. In order, they check for, and update if necessary, keypresses, missiles, aliens and landmines. The latter subroutine doesn't really do anything until the second level is attained. The seemingly random appearance of landmines is controlled by COUNT, which is incremented every time a major subroutine is completed. When the value in COUNT is roughly between \$B0 and \$B4, the time is ripe for a landmine.

The listing for this program was produced on *Merlin*, a 6502 assembler package manufactured by Roger Wagner Publishing. It should be compatible with any assembler you have kicking around, with perhaps minor changes to the DFB and HEX statements. Merlin assembles to a default address of \$8000, but you can choose any address you wish to put the code... within limits, of course... the screen starts at \$400, and would make for a messy assembly.

Blort The Man Down

Composed of just over one kilobyte of code, *Blort!* is a challenging arcade game that, while it won't provide slick multi-coloured high resolution delights, won't break the bank when the uncontrollable urge to play video games possesses your shaking hands.

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Over the last few years... as the story goes... we've written a lot of programs for the Apple which we've published in Computing Now!. Most of them have taken a lot of work... they've all been thoroughly debugged.

Typing in programs... especially extensive ones, like Blort! in this issue... is a long, cold mouthful of tedium. As such, we've gathered together a collection of some of the best Apple code we've created, all on one disk. Enshrined here are some of the classics of the past.

You get DOSdial, the dialing terminal program, Clef Hanger, an Apple music box, Skyhook, a radio teletype converter, Fruit Crate, a small bulletin board system, MuGraph, an experimental sound program, Hashit, a sorting routine, JoyGraph, a graphics program and, of course, Blort!, as seen in this issue.

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Apple Wunderdisk
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Your gnarled, aching fingers will love you for it.

Blort! for the Apple

```

1 *****
2 *
3 *          BLORT!
4 *
5 *      By John Rudzinski
6 *
7 *      (c) 1984 HennSoft
8 *
9 * Not to be sold to prophets
10 *
11 *****
12 BASIC    EQU    $E003
13 BEEP     EQU    $FBE4
14 HOME     EQU    $FC58
15 PRINT    EQU    $FDF0
16 GET      EQU    $FDB8
17 LOC      EQU    $05
18 LOC1     EQU    $06      ;LOCATION OF SHIP
19 SHOTLOC  EQU    $07
20 SHOTLOC1 EQU    $08      ;LOCATION OF BULLET
21 UP       EQU    $19      ;BULLET STATUS
22 ALOC     EQU    $0B
23 ALOC1    EQU    $0C      ;LOCATION OF ALIEN
24 *
25          JMP     START    ;HIT TH' ROAD
26 *
27 FIRE     DFB     $400
28 FLASH    DFB     $400
29 LEVL     DFB     $401
30 SHIPS     DFB     $403
31 ALNUM     DFB     $400      ;ALIEN NUMBER
32 ALEF1     DFB     $401      ;ALIEN LEFT
33 ARI11     DFB     $400      ;ALIEN RIGHT
34 LEFT      DFB     $400
35 RIGHT     DFB     $400
36 COUNT     DFB     $400      ;COUNTER
37 LM        DFB     $400      ;LANDMINE
38 PAUSE     DFB     $406
39 LVL1     ASC     "LEVEL: 1"00
40 TITL      ASC     "BLORT!"00
41 SCOR      ASC     "SCORE: 000000"00
42 ALIEN1     DFB     $425      ;INVERSE %
43 ALIEN2     ASC     "$"
44 ALIEN3     DFB     $422      ;INVERSE "
45 ALIEN4     ASC     "$"
46 SCREEN1   ASC     "BLORT!"8D8D
47          ASC     "BY JOHN RUDZINSKI"8D
48          ASC     "(c) 1984 HENNSOFT"8D8D
49          ASC     "A = KILL LANDMINE"8D
50          ASC     "Z = LEFT"8D
51          ASC     "X = RIGHT"8D
52          ASC     "[SPACE] = FIRE"8D
53          ASC     "[ESC] = QUIT"8D8D
54          ASC     "HIT ANY KEY TO BEGIN"00
55 *
56 START     JSR     INSTR      ;SHOW INSTRUCTIONS
57          LDA     $463
58          STA     LOC
59          LDA     $407
60          STA     LOC1      ;FIRST SHIP POSITION
61          LDA     $4A5
62          STA     ALOC
63          LDA     $406
64          STA     ALOC1      ;1st ALIEN POSITION
65          JSR     HOME
66          JSR     SETUP      ;INITIALISE GAME
67 MAIN      JSR     KEY?
68          JSR     D LAY
69          INC     COUNT
70          JSR     SHOT?      ;BULLET UPDATE
71          JSR     D LAY
72          INC     COUNT
73          JSR     ALIEN?      ;ALIEN UPDATE
74          JSR     D LAY
75          INC     COUNT
76          JSR     MINE?      ;LANDMINE CHECK
77          JSR     D LAY
78          INC     COUNT
79          JMP     MAIN      ;OVER AND OVER...
80 *
81 INSTR     JSR     HOME
82          LDX     $4FF
83 X1        INX
84          LDA     SCREEN1,X
85          CMP     $400      ;END OF TEXT?
86          BEQ     XIT
87          JSR     PRINT
88          JMP     X1
89 XIT       JSR     GET
90          RTS
91 *
92 SETUP     LDA     $4C1      ;A
93          STA     $425
94          STA     $426      ;TWO SHIPS
95          LDX     $4FF
96 X2        INX
97          LDA     LVL1,X      ;PRINT LEVEL
98          CMP     $400
99          BEQ     B1
100         STA     $481,X
101         JMP     X2
102 B1        LDX     $4FF
103 X3        INX
104         LDA     TITL,X      ;PRINT TITLE
105         CMP     $400
106         BEQ     B2
107         STA     $490,X
108         JMP     X3
109 B2        LDX     $4FF
110 X4        INX
111         LDA     SCOR,X      ;PRINT SCORE
112         CMP     $400
113         BEQ     B3
114         STA     $49A,X
115         JMP     X4
116 B3        LDX     $4FF
117 X5        INX
118         CPX     $426
119         BEQ     B4
120         LDA     $4DF
121         STA     $501,X      ;UPPER BORDER
122         JMP     X5
123 B4        LDX     $4FF
124 X6        INX
125         CPX     $426
126         BEQ     B5
127         STA     $7D1,X      ;LOWER BORDER
128         JMP     X6
129 B5        LDA     $4C1      ;SHIP
130         LDY     $400
131         STA     (LOC),Y      ;IN SITU
132         RTS
133 *
134 KEY?      LDY     $400
135         LDA     $C000      ;CHECK KEYBOARD
136         CMP     $480      ;VALID?
137         BMI     KOUT      ;NO, SCRAM
138         CMP     $4C1      ;'A' (KILL LANDMINE)
139         BNE     KC0
140         LDA     LM
141         CMP     $401
142         BNE     KOUT      ;IF NO MINE, FORGET IT.
143         LDA     $4DF
144         STA     $7E3      ;' ' (BOTTOM BORDER)
145         STY     LM
146         JMP     KOUT
147 KC0       CMP     $4DA      ;Z (LEFT)
148         BNE     KC1
149         STY     RIGHT
150         LDA     $401
151         STA     LEFT
152         JMP     KOUT      ;SETUP FOR LEFT
153 KC1       CMP     $4D8      ;X (RIGHT)
154         BNE     KC2
155         STY     LEFT
156         LDA     $401
157         STA     RIGHT
158         JMP     KOUT      ;SETUP FOR RIGHT
159 KC2       CMP     $4A0      ;SPACE (FIRE)
160         BNE     KC3
161         LDA     FIRE
162         CMP     $401
163         BEQ     KOUT
164         LDA     $401
165         STA     FIRE
166         STY     UP      ;ZERO OUT UP
167         JMP     KOUT
168 KC3       CMP     $49B      ;ESC (END GAME)
169         BNE     KOUT
170         STY     UP
171         STY     FIRE
172         STY     LM
173         LDA     $401
174         STA     LEVL
175         JMP     ENDGAME      ;CLEAR AND LEAVE
176 KOUT      STY     $C010      ;CLEAR STROBE
177         LDA     LEFT
178         CMP     $401
179         BNE     RITE
180         LDA     $751      ;PEEK LEFT BORDER
181         CMP     $4A0      ;IF NOT SPACE,
182         BNE     RD1R      ;CHANGE DIRECTION
183         STA     (LOC),Y
184         DEC     LOC
185         LDA     $4C1
186         STA     (LOC),Y
187         RTS
188 RITE      LDA     $776      ;RIGHT BORDER
189         CMP     $4A0      ;IF NOT SPACE,
190         BNE     LD1R      ;CHANGE DIRECTION.
191         STA     (LOC),Y      ;BLANK OUT SHIP
192         INC     LOC      ;AND MOVE POINTER
193         LDA     $4C1
194         STA     (LOC),Y
195         RTS      ;STICK SHIP ON SCREEN,
196 RD1R      LDA     $4A0      ;AND LEAVE.
197         STA     (LOC),Y      ;CLEAR OUT
198         INC     LOC      ;OLD LOCATION
199         LDA     $401      ;UP IT BY ONE
200         STA     RIGHT      ;CHANGE TO RIGHT
201         STY     LEFT      ;DISABLE LEFT
202         LDA     $4C1      ;GET A SHIP
203         STA     (LOC),Y      ;STICK IN NEW SPOT
204         RTS      ;AND TAKE A POWDER.

```


205	LDIR	LDA	##A0			309	LDA	##A0			413	RTS			
206		STA	(LOC),Y	;BLANK OLD LOCATION		310	STA	(SHOTLOC),Y			414	*			
207	DEC	LOC		;MOVE POINTER		311	STY	UP			415	MINE?	LDA	LEVL	;IF WE AREN'T
208	LDA	##01				312	STY	FIRE			416	CMP	##02		;AT LEVEL 2
209	STA	LEFT		;ACTIVATE LEFT AND		313	STY	FLASH			417	BEQ	M1		
210	STY	RIGHT		;DEACTIVATE RIGHT		314	RTS				418	RTS			
211	LDA	##C1		;STICK SHIP IN NEW		315	NORMUP	LDA	##A0		419	M1	LDA	LM	;IF LANDMINE ISN'T
212	STA	(LOC),Y		;LOCATION		316	STA	(SHOTLOC),Y	;BLANK OUT OLD LOCATION		420	CMP	##01		;ACTIVE, SEE IF WE
213	RTS					317	INC	UP			421	BNE	M2		;CAN MAKE IT ACTIVE.
214	*					318	SEC				422	LDA	\$763		;ACTIVE. PEEK ABOVE
215	SHOT?	LDY	##00			319	LDA	SHOTLOC			423	CMP	##A0		;LANDMINE. IF NOT SPACE
216	LDA	FIRE				320	SBC	##80			424	BNE	MINEXP		;THEN WE GO BOOM.
217	CMP	##01				321	STA	SHOTLOC			425	RTS			
218	BEQ	FLCHK		;CHECK IF FLASHED		322	LDA	SHOTLOC1			426	M2	LDA	COUNT	;IF COUNT IS
219	JMP	S DELAY		;NO FIRE, SO DELAY		323	SBC	##00			427	CMP	##B0		;WITHIN THE
220	FLCHK	LDA	FLASH			324	STA	SHOTLOC1			428	BPL	RANGE		;PROPER RANGE
221	CMP	##01		;HAVE WE FLASHED?		325	LDA	##A1	;AND STICK ! IN		429	RTS			
222	BEQ	YFLAS				326	STA	(SHOTLOC),Y	;NEW LOCATION.		430	RANGE	CMP	##B5	;THEN IT'S LANDMINE
223	SEC					327	RTS				431	BMI	LMCOOL		;TIME!
224	LDA	LOC				328	SUBUP	CLC			432	RTS			;IF NOT, LEAVE.
225	SBC	##80				329	LDA	##A0			433	LMCOOL	LDA	##01	
226	STA	SHOTLOC				330	STA	(SHOTLOC),Y			434	STA	LM		;ACTIVATE LM
227	LDA	LOC1				331	LDA	SHOTLOC			435	LDA	##20		
228	SBC	##00				332	ADC	##58			436	STA	\$7E3		;PLACE MINE
229	STA	SHOTLOC1				333	STA	SHOTLOC			437	RTS			;AND LEAVE.
230	LDA	##01				334	LDA	SHOTLOC1			438	MINEXP	JSR	BEEP	
231	STA	FLASH				335	ADC	##03			439	LDA	##6A		;FLASHING "A"
232	LDA	##20				336	STA	SHOTLOC1			440	STA	\$763		;WHERE SHIP WAS
233	LDX	##FF				337	LDA	##A1			441	JSR	D LAY		;PAUSE
234	XINK	INX				338	STA	(SHOTLOC),Y			442	LDA	##60		;FLASHING SPACE
235	CPX	##10				339	INC	UP			443	STA	\$763		
236	BEQ	STEP				340	RTS				444	JSR	D LAY		
237	STA	(SHOTLOC),Y		;FLASH LOCATION.		341	S DELAY	LDX	##FF		445	LDY	##00		
238	JMP	XINK				342	XINQUE	INX			446	LDA	##A0		;SPACE
239	STEP	JMP	NORMUP			343	CPX	##10			447	STA	\$763		;BLANK OUT MESS
240	YFLAS	LDA	UP	;PROGRESS OF BULLET		344	BEQ	ENDEL			448	STA	(SHOTLOC),Y		;AND MISSLE
241	CMP	##05		;1ST SCREEN SPLIT?		345	JMP	XINQUE			449	LDA	##DF		;UNDERSCORE
242	BNE	SECSPL		;NO, TRY SECOND...		346	ENDEL	RTS			450	STA	\$7E3		;WHERE LANDMINE WAS
243	JSR	SUBUP				347	*				451	STY	LM		;ZERO OUT ALL
244	RTS					348	ALIEN?	LDY	##00		452	STY	UP		;THE OLD POINTERS
245	SECSPL	CMP	##0D	;2nd SCREEN SPLIT?		349	LDA	ALNUM			453	STY	FIRE		;WHICH NEED TO BE
246	BNE	BOOM?		;NO, MAYBE AN ALIEN HIT?		350	CMP	##01			454	STY	FLASH		;RESET AFTER YOU
247	JSR	SUBUP				351	BNE	A1			455	STY	ARIGHT		;GO UP IN FLAMES.
248	RTS					352	FAL	LDX	ALIEN1		456	LDA	\$425		;IF THERE'S NO 'A'
249	BOOM?	CMP	##0F			353	JMP	AMOVE	;GET ALIEN IN X		457	CMP	##A0		;UP THERE, CHECK
250	BNE	TOPBORD		;HIT THE ROOF?		354	A1	CMP	##02	;2nd ALIEN?	458	BEQ	LAST?		;THE ONE BESIDE IT.
251	LDA	##A0				355	BNE	A2			459	LDA	##A0		;BLANK OUT FIRST
252	STA	(SHOTLOC),Y		;BLANK OUT BULLET		356	LDX	ALIEN2			460	STA	\$425		; 'A', LEAVING ONE.
253	INC	UP				357	JMP	AMOVE			461	DEC	SHIPS		;FEWER SHIPS
254	SEC					358	A2	CMP	##03	;3rd ALIEN?	462	RTS			;BACK TO THE GRIND.
255	LDA	SHOTLOC				359	BNE	A3			463	LAST?	LDA	\$426	;IF THIS LOCATION
256	SBC	##80				360	LDX	ALIEN3			464	CMP	##A0		;HAS NO 'A'
257	STA	SHOTLOC				361	JMP	AMOVE			465	BEQ	THE END		;THEN GAME OVER.
258	LDA	SHOTLOC1				362	A3	CMP	##04	;4th ALIEN?	466	LDA	##A0		;ELSE, BLANK IT
259	SBC	##00				363	BNE	A4			467	STA	\$426		;OUT AND DECREASE
260	STA	SHOTLOC1				364	LDX	ALIEN4			468	DEC	SHIPS		;THE SHIP COUNT.
261	LDA	(SHOTLOC),Y		;PEEK LOCATION...		365	JMP	AMOVE			469	RTS			
262	CMP	##A0		;ARE WE SAFE?		366	A4	STY	ALNUM	;JUST IN CASE	470	THE END	LDA	##03	;BEFORE WE FINISH
263	BNE	XPLO		;NOPE, WHACKED AN ALIEN		367	INC	ALNUM			471	STA	SHIPS		;OFF WE HAVE TO
264	LDA	##A1		;BULLET ('I')		368	JMP	FAL			472	LDA	##01		;RESET ALL THE
265	STA	(SHOTLOC),Y		;STICK ON SCREEN		369	AMOVE	LDA	ALEFT	;GOING LEFT?	473	STA	LEVL		;LABELS TO THEIR
266	RTS			;AND TAKE A POWDER.		370	CMP	##01			474	STY	ALNUM		;ORIGINAL VALUES
267	XPLO	JSR	BEEP	;REMEMBER XPLO '67?		371	BNE	RECHTS			475	LDA	##06		;IN CASE PLAY IS
268	JSR	INCSCOR		;UP SCORE BY 100		372	LDA	##681			476	STA	PAUSE		;DESIRED AGAIN.
269	LDA	ALNUM		;CHECK WHICH ALIEN'S EXTANT		373	CMP	##A0			477	JMP	START		
270	CMP	##02		;IF IT'S THE SECOND...		374	BNE	CHRG			478	*			
271	BNE	CH4				375	STA	(ALOC),Y			479	ENDGAME	JSR	HOME	
272	INC	LEVL		;WE'RE GOING TO LEVEL 2.		376	DEC	ALOC			480	JMP	BASIC		
273	LDA	##B2		; '2'		377	LDA	(ALOC),Y			481	*			
274	STA	\$488				378	CMP	##A0			482	INCSCOR	LDA	\$4A4	
275	LDA	##04				379	BEQ	XCHNG			483	CMP	##B9		;900 YET?
276	STA	PAUSE				380	JMP	XPLO			484	BEQ	MOREADD		
277	JMP	ALUP				381	XCHNG	TXA			485	INC	\$4A4		;UP BY 100
278	CH4	CMP	##04		;LAST ALIEN ALREADY PRINTED?	382	STA	(ALOC),Y			486	RTS			
279	BNE	ALUP				383	RTS				487	MOREADD	LDA	##B0	; '0'
280	DEC	LEVL		;RESET BACK TO LEVEL 1		384	RECHTS	LDA	##6A		488	STA	\$4A4		
281	LDA	##B1		; '1'		385	CMP	##A0			489	LDA	\$4A3		
282	STA	\$488		;JAM ON SCREEN		386	BNE	CHLEF			490	CMP	##B9		;9000?
283	LDA	##06				387	STA	(ALOC),Y			491	BEQ	TENTHOU		
284	STA	PAUSE				388	INC	ALOC			492	INC	\$4A3		
285	STY	ALNUM				389	LDA	(ALOC),Y			493	RTS			
286	STY	ARIGHT				390	CMP	##A0			494	TENTHOU	LDA	##B0	
287	LDX	##01				391	BEQ	XCHNG1			495	STA	\$4A3		
288	STX	ALEFT				392	JMP	XPLO			496	LDA	\$4A2		
289	ALUP	INC	ALNUM			393	XCHNG1	TXA			497	CMP	##B9		;90000?
290	LDA	##20		;INVERSE SPACE		394	STA	(ALOC),Y			498	BEQ	HUNTHOU		
291	LDX	##10				395	RTS				499	INC	\$4A2		
292	D1	DEX				396	CHRG	LDA	##A0		500	RTS			
293	CPX	##00		;FLASHED ENOUGH?		397	STA	(ALOC),Y			501	HUNTHOU	LDA	##B0	
294	BEQ	SPC OUT		;YEAH, BLANK IT OUT.		398	INC	ALOC			502	STA	\$4A2		
295	STA	(SHOTLOC),Y				399	LDA	##01			503	INC	\$4A1		
296	JMP	D1				400	STA	ARIGHT			504	RTS			
297	SPC OUT	LDA	##A0			401	STY	ALEFT			505	*			
298	STA	(SHOTLOC),Y				402	TXA				506	D LAY	LDY	PAUSE	
299	STY	UP				403	STA	(ALOC),Y			507	LDX	##FF		
300	STY	FIRE				404	RTS				508	INX			
301	STY	FLASH				405	CHLEF	LDA	##A0		509	CPX	##FF		
302	LDA	##A5				406	STA	(ALOC),Y			510	BEQ	DECHWY		
303	STA	ALOC				407	DEC	ALOC			511	JMP	INX		
304	LDA	##06		;RESET ALIEN		408	LDA	##01			512	DECHWY	DEY		
305	STA	ALOC1		;LOCATION		409	STA	ALEFT			513	CPY	##00		
306	RTS					410	STY	ARIGHT			514	BEQ	DELEND		
307	TOPBORD	CMP	##12		;HIT UPPER BORDER?	411	TXA				515	JMP	INX		
308	BNE	NORMUP			;NO, JUST MOVE UP.	412	STA	(ALOC),Y			516	DELEND	RTS		

CNI

The Hacking of ZCPR2



Using CP/M can often be an exercise in patience, and one begins to wonder if it isn't actually derived from one of those tests they used to put mediaeval monks to see if they were worthy. Here... at last... is a way to make CP/M behave.

by Steve Rimmer

There actually was a time... measured in the same sorts of scales the archaeologists use on public television... when CP/M was something unspeakably slick. Not only was it regarded as being a gift buoyed aloft to the waiting

arms of the chip gods and all sorts of other splendid stuff like that... it was even kind of state of the art.

It should be recalled, however, that when CP/M was initially written... on a single drive system salvaged from a slag heap, largely using an assembler that punched paper tape... microcomputer operating systems were scarce to the point of nonexistence. It was a definite improvement over nonexistence. It is, however, fair to say it has been surpassed since then.

Users of slicker operating systems, such as MS-DOS, will peer disparagingly down at CP/M and make upper class noises at it for its lack of amenities and general user unfriendliness. However, if you are parked before an eight bit system you will have probably perceived by now that plugging an MS-DOS disk into your machine will avail you of a few colourful boot error messages at best. CP/M users are, by their very

natures, stuck with CP/M, slaving hunchbacked jungle troll that it may be.

There is a hook to all this... as there must always be. Read on, and you will be made witness to a ladder upon which to drag yourself from the pit of a primitive operating system. CP/M can have talents you've probably never dreamed possible.

ZCP Argh, Billy

When you boot a CP/M disk a large chunk of code... the operating system... flings itself into high memory and starts behaving like CP/M. This consists of three distinct parts, to wit, the BIOS, the BDOS and the CCP. Sounding very much like Bohemian political parties, these things have specific functions.

The BIOS is the part of CP/M which is unique to your computer. It translates the things which the rest of CP/M does into instructions which your system can make

sense of at the hardware level. We've talked about BIOS's before.

The BDOS, or the disk operating system, is what does all the useful programming things. It takes a set of instructions to itself for things like character I/O and file handling and translates them into calls to the BIOS. If you've been getting into the CP/M based programs that have been appearing in Computing Now! you'll have been using the BDOS quite a bit.

The last bit is the CCP, or the console command processor. This is the thing that actually interfaces with you. It shows you the pointy prompt on the screen and runs programs for you when you type their names. It also hangs onto the resident commands, like TYPE and DIR, executing them from code it has stashed in there somewhere.

The CCP is, in fact, what makes CP/M act so primitively. As exercises in human engineering go, it's not very sophisticated. Thing is, it was written a long time ago on a system which had relatively little memory for a chip no one uses much any more. That

last bit is actually the crux of the biscuit.

You will probably have noted that your system uses a Z80 microprocessor. This is a chip which was devised by a number of dudes that left Intel, the corporate monolith that does the 8080 and the 8088, the latter of which being the soul of the IBM PC. The 8080 was actually a pretty early processor, and it had a lot of things left out of it.

CP/M was written for the 8080 and, because 8080 assemblers are pretty common, the programs in Computing Now! have all been written for the 8080. They run on Z80 based machines because the Z80 is upwards compatible with the 8080. It supports all the 8080 instructions but it adds a few more to the soup.

If CP/M were to be rewritten in Z80 code it could be considerably smaller or, more to the point, one could cram a lot more three eyed nether beings into the same space. Actually, most BIOS's for Z80 machines are already written using Z80 op codes... it's the CCP that's the important bit.

It is possible to write a program which will overlay the CCP and do the same

stuff... but do more of it. In fact, there's no need, as one already exists. As you might have gathered by the screaming title at the onset of this article, it is called ZCPR2. Installed in CP/M in place of the existing CCP, ZCPR allows one to customize CP/M to one's needs. It also just makes using the system a bit smoother.

ZCPR2 is a handy thing, and, more to the point, is completely free. It lives in the public domain, having been put there by its author. However, getting ZCPR to happen on your computer is not a trivial task. We're going to look at some of the nuances here.

Kill The CCP

The ZCPR package... the whole package... is massive. It occupies most of a box of eight-inch single density disks. However, almost all of this can be done away with for a simple installation of the main toys. You can puzzle over the rest of the stuff once your screen stops flashing.

The facilities of a basic ZCPR system will vary from user to user. This is one of the nice things about the whole sloth ranch...

ZCPR2 for the Apple][+

Apple CP/M is funky at best . . . and down right nasty most of the rest of the time. It has weirdnesses in it that most humans wouldn't want to see at two in the morning on the late show. If curses work the people who wrote it will spend the afterlife so far down they'll be able to roast marshmallows by holding them over their heads.

It's a treat.

There are a few things one can do to make CP/M run better on the Apple . . . one of the most promising is to install ZCPR2 in it. Suddenly, your system will reboot, your life will become meaningful again, the speaker will sing like Pavarotti or Roger Daltry . . . your choice . . . and you'll live for a million years. Or something like that.

In fact, ZCPR2, when properly installed, will allow you to customize the user interface of CP/M to optimize it for your needs. Whether you program, process words, spread sheets or just generally compute you can make CP/M behave in the most advantageous way for what you're up to.

See the article "The Hacking of ZCPR2" elsewhere in this issue for more details.

In fact, ZCPR2 doesn't install easily on the Apple in its usual incarnation. We figured out a way to do it, patched it to remove a few of the wrinkles Apple CP/M normally has and included a detailed instruction file to make the whole thing fairly painless.

In order to use the Apple ZCPR2 package, you will need

An Apple][+ or compatible system with 64K of RAM.

A Z80 Softcard and Microsoft CP/M master.

MAC.COM, CPM56.COM and DDT.COM.

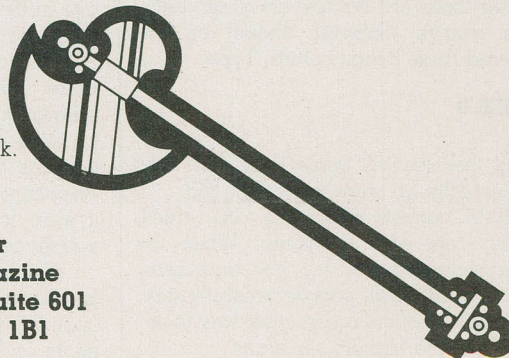
Two Drives

Some knowledge of using assembly language and, of course, our disk.

The disk is available for

\$22.95

Apple ZCPR2 Offer
Computing Now! Magazine
25 Overlea Boulevard, Suite 601
Toronto, Ontario M4H 1B1



Fine Print:

1. The entire ZCPR2 package is in the public domain. We are not charging a fee for this code. The cost of this package is to defer the cost of the media, shipping, handling and the patches and preparation done by us.
2. Every effort has been made to insure that Apple ZCPR2 will function properly in the environment for which it was designed. Please note that we cannot assist you in adapting it for special applications or for unusual computers.

The Hacking of ZCPR2

you get to pick which bits you want to use. As such, you will be able to use the limited space available to put the CCP in to its best advantage.

To begin with, ZCPR will give you the usual CP/M built in commands DIR, ERA, TYPE, SAVE, and REN. The USER command... you may not have even known it existed in regular CP/M.... isn't of much use any more, as we'll see. If you choose to have these... you may not... you'll find that they behave themselves better under ZCPR. For example, ERA can be instructed to prompt you before it erases each file. SAVE can accept hexadecimal sector numbers... which is handy, as this is how DDT likes to give them to you. TYPE can be set to page or not, as you wish, and with a command line toggle to reverse the situation.

There are also a number of other transient commands you can have ZCPR provide for you if you want them. GO will re-execute the last program you ran on the system. GET will load a file into memory without executing it and JUMP will transfer control of the system to any location you like. These are, to be sure, largely programmer's tools.

Finally, ZCPR provides a very useful LIST command, which will type files to the printer. Both TYPE and LIST strip off the high order bits of WordStar files.

ZCPR, unlike straight up CP/M, allows you to make practical use of the USER areas of your system. You may not have known these existed, or, in fact, what they were good for. This is, to a large extent, because CP/M as it comes from the byte factory doesn't have any software to support them.

If you type

USER 1

on a reasonably full disk and then kick a DIR command you will probably be surprised to find that there are no files on your disk... unless you've skipped ahead or encountered these things before. Type

USER 0

and all the files will come back. The files didn't actually go anywhere... you did.

CP/M consists of sixteen disk areas, running from zero to fifteen. When the system boots it boots you into area zero, which is where most people generally stay. Straight CP/M offers no practical way to get files up into the higher user areas.

The upper areas are handy, however. You can keep all the files pertaining to a specific application or task in a separate user area and deal with a few reasonably



small, uncluttered directories rather than one large nasty one.

There are a number of public domain utilities, such as DISK and VFILER, which allow for the movement of files between user areas. Check out the Almost Free software elsewhere in this issue.

The only hassle with using user areas like this under straight CP/M is that all the utilities which you want to use in all the user areas must be duplicated in each area... a waste of disk space to be sure.

ZCPR offers a number of powerful user area facilities. The first is the concept of paths.

When you type the name of a transient program... such as WS, for WordStar, CP/M looks for it on the currently logged on disk in the current user area. This is its *command path*... it's exceedingly short. Under ZCPR2 you can have the thing look along a more involved path. You can, in fact, specify any number of drives and user areas to be searched in turn for any command you call for. If what you wanted is found elsewhere along the path it will execute as if it were found in the drive and user area you're logged into.

This is quite the party. You can, for example, stash all the things you normally use up in, say, area fifteen of drive A:. This might include D, DISK, WordStar and so forth. Thereafter, you'll be able to call these things up even if you can't see them on your current directory listing. In effect, they'll behave as if they were built in commands.

ZCPR can also be set up to run an alternate command if it can't locate the one you want along the path you've enabled for it. It will take the name of the command you gave it as a command line parameter if you want it to. You could, for example, make this feature into a more user friendly error message. You could, alternately, have the command it runs be the SUBMIT program, so that you could just type the names of SUB files to have them execute, as is the case under MS-DOS.

ZCPR2 has a lot of applications in creating user friendly or straight up turnkey systems for untrained operators.

In fact, the facilities of ZCPR2 roll on for miles or, if you work for the government, kilometers. At this point it's probably a good trip to leap into the grotty reality of the situation and start slashing away at those bits.

The Hack Begins

In order to successfully get ZCPR2 happening you'll need some disks and some software. To begin with, prepare a disk with MAC, DDT, and SYSGEN on it. These are the basic tools. You'll need MAC, rather than ASM, as ZCPR2 uses macros to handle the Z80 mnemonics, among other things. Add to this ZCPR2.ASM, ZCPRHDR.LIB and CCPLOC.COM from the ZCPR2 package. There's a note at the end of this feature regarding how to obtain this stuff.

There are three distinct steps in making ZCPR2 happen. The first involves figuring out how to get the new code onto the disk in

place of your existing CCP so, upon rebooting your system, ZCPR will happen rather than the regular command processor.

The most useable way to handle this is to stuff ZCPR into a SYSGEN image. To do this, first off, run SYSGEN. Take the system from drive A: but hit return when it asks you what drive you want to put the system on. This will exit CP/M. Do a

SAVE 64 CPM.COM

Actually, the number of sectors you save will vary with your system... you probably don't need this many of them. However, saving too many has no real bad vibes. This will leave you with CP/M in a file, where it can be manipulated.

The second step is to make ZCPR real, that is, to set up the myriads of equates in the ZCPRHDR file to correspond to the location of your system in memory and its place in the SYSGEN image CPM.COM. I'm going to use an example set of values here... the ones for your system will vary. However, you will be able to derive them in the same way.

To begin with, run CCPLOC. This will give you the locations in memory for the BIOS, the BDOS and the CCP. We couldn't care less about the BDOS, but write the other two down somewhere. In my case, the CCP was at D000H and the BIOS at E600H. Note that the BIOS is always 1600H above the CCP.

Next, do

DDT CPM.COM

Somewhere in the nether reaches of CP/M, as it's represented in the SYSGEN image, you will find the start of the CCP. This is a bit tricky. You'll be able to tell when you've found it because it will have a Digital Research copyright notice and two jump instructions. Most CCPs start at 0980H in the SYSGEN image, with a smaller number at 0A00H. If you don't find it there it could be almost anywhere... prepare yourself for a bit of a trek. In doing the Apple implementation, mentioned elsewhere in this issue, it turned up at 0E00H.

Write down the address for the start of the CCP in the SYSGEN image.

Now, what we need to know is the offset, the distance between the SYSGEN CCP and the real one. This can be ascertained by using an oft ignored feature of DDT, its built in hexadecimal calculator. In my case, with the CCP at D000H and the SYSGEN image at 0980H, I would

-HD000.0980

which would give me two numbers. The second one is the offset, in this case being 3980H. This concludes the essential groping around in CP/M.

Stage Left

The second part of the second step involves editing ZCPRHDR.LIB. In most cases, this is the only file that wants manipulation, as it contains all the customizable equates for ZCPR2.ASM. It will get sucked into the larger source file by MAC.

The equates which determine where ZCPR will go all live at the top of the header file. If you get these set up properly ZCPR will function... perhaps not in quite the way you want it to; that will come in a bit. If you get them wrong, ZCPR will leap off the edge of the nearest cliff and sing a death chant on the way down.

The first equate you'll encounter is REL, which should be false. It is involved in a different integration process which is rarely applicable. You'll then encounter three equates, MSIZE, BIOSEX and CPRLOC, which should be commented out. These are involved in a process for determining the CCP position in situations where you forgot to get the CCPLOC program. They're notable in that they rarely work right.

The object of the quest is the equate CPRLOC sitting on its own, which should be uncommented and filled in with the location of your CCP, 0D600H in my case.

The next thing you'll encounter is the equate CPRR. It should be filled in with the location of your SYSGEN image CCP minus that of the real CCP. The easiest way to do this is to let the assembler figure it out. In my case, I would put in

CPRR EQU 0980-CPRLOC

We defined the value of CPRLOC above.

This takes care of the tricky bit and, if you've set these properly, ZCPR will probably work fine. However, it's worth going through stage three of the process before you try the big fix, as there are a few things in there that can zap you.

The rest of the equates in the header file determine how the ZCPR package will behave for you once it's actually running. There are a few catches to this.

The first catch is that ZCPR must fit into less than two K once it has been assembled. If it's bigger than this it will overwrite part of the BDOS, causing the aforementioned leap from the aforementioned cliff. This is not as troublesome as it sounds, as ZCPR will throw an error message in assembly if it winds up a bit rotund.

This does mean, however, that you

can't enable all the features. You'll have to pick the ones you really want. This is rarely a problem, as three quarters of them will be inappropriate for any given situation. You can, of course, create different permutations of these features for different applications.

The second catch is in that, given its way, ZCPR will want to locate a number of things outside itself. Included in these are its stack, its file control block, its path definition and its command buffer. This is a good thing if you can do it, as it frees up an awful lot of internal space for other things, and you can have more features on line. However, most systems don't have enormous amounts of RAM just lying about in a protected space for these buffers.

ZCPR2 has a lot of applications in creating user friendly or straight up turnkey systems for untrained operators.

In this example, we're going to make all the buffers internal. If you do have some blank RAM you can change this later... I used the Apple's forty column screen RAM when I was fiddling with the fruit, and users of systems with MOVCPM can make artificially small systems if they have a mind to.

The Deadly Equates

Let's check out the works.

The first important equate is SUBON. Setting it true will enable the processing of SUBMIT files. There are alternatives to SUBMIT, so you may want to disable this feature to make room for other things.

Under ZCPR, you can deal with disks and user areas in much the same way as you deal with disks alone under CP/M. To type a file on drive B: user area six, one would say TYPE B6:FLATCAT.DOC, for example. You could also run programs like this, as in

A0>B6:WS

to run Wordstar on B6: from A0:. To enable this facility, one would set the equate DRVPREFIX true.

Changing user areas under ZCPR is much easier than it is under CP/M. You'd just type the drive and user area you want to go to followed by a colon. However, you

The Hacking of ZCPR2

can disable this facility by setting USERON false if you are creating a secure system for untrained operators.

The next set of equates lets you decide which of the transient commands you want to have active. You'd set the appropriate ones true. Keep in mind that commands you don't really need will take up space which could be otherwise used by something you do want. For example, don't enable DIR if you always use D.

The next bit is the path. The path will be internal in this example, so set INTPATH true. The path itself is specified immediately after this in a macro.

You can specify any number of stops along the path. Bear in mind that a long path takes a long time to search if you type a bad command name and it also takes up space in the CCP. I usually end the path with drive A: area fifteen, which is where I keep all the usual utility programs.

If you want it to, ERA will prompt you for verification on each file it kills. To enable this, set ERAV true and ERDFLG to the letter you'll input if you want a file killed. This feature will prove to be a turkey if you do things like ERA *.BAK a lot.

As I noted above, the system prompt under ZCPR is usually one character longer than it is under CP/M, showing you both the logged in drive and the user area. You can disable both these characters, leaving only the arrow head, by setting DUPRMPT to false.

MULTCMD allows for multiple commands on a line, but it needs an external buffer, so we'll set it false and ignore the rest of its attendant equates for the time being.

The ZCPR wheel probably deserves some attention. The next group of equates allow you to determine which of the transient commands will be active or inactive depending upon the setting of the *wheel* byte. You area probably blissfully ignorant of exactly what a wheel byte is. This is cool... you'll probably elect not to use it.

The wheel is a byte which can be set to either zero or non-zero. If you set it to zero and try to use a transient command that has been defined as being wheel dependant it will pretend it isn't there. There's a utility included with the ZCPR2 package which sets the wheel byte. Again this is a secure system thing, and you can define all the wheel dependant equates false if you don't need this feature.

The INTSTACK equate, which comes next, should be set to true. Likewise EX-TFCB should be false.

The CMDRUN feature is down at the bottom of the header file. If you enable it it will run a default file if it can't find the one

you asked for... we spoke of this a while ago. The file name is found at CMDFCB. The file can be placed anywhere along the path you fancy having it... or just in the root if you define ROOTONLY true, making the search for it much quicker if you've set up a large path.

This facility takes up a fair bit of space in the CCP, and, as such, won't fit if you've snatched a double helping of built in commands and have all the buffers internal.

The rest of the stuff in the header can probably be left alone unless you want to make your system particularly weird. For example, you could change CPRMPT to something different... it normally holds the arrow head character which forms the command prompt.

Making It Happen

Having customized ZCPRHDR.LIB for your system, the lively bit is now about ready to come down. It is, in fact, a bit of an anticlimax. Save the adjusted header and return to CP/M. Assemble the ZCPR2.ASM file by doing

A>MAC ZCPR2 \$PZ SZ

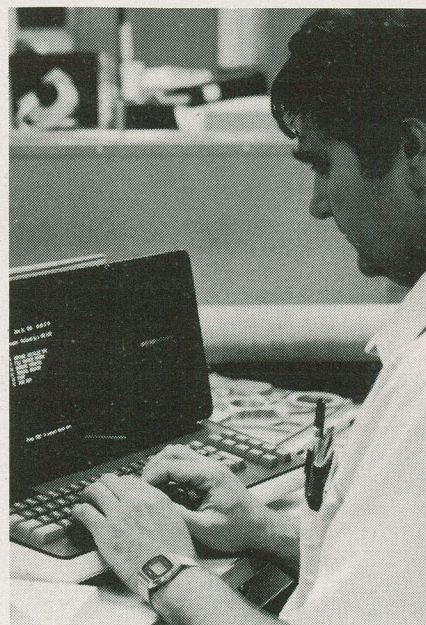
The parameters kill the symbol and listing files, which will get rather massive otherwise.

When the assembly is complete... it takes a while... you should have ZCPR2.HEX... and no error messages. Be especially careful to look for the one which says that ZCPR is larger than two K.

You'll now have to get ZCPR into the SYSGEN image and onto your disk. This is the procedure. Remember that these are the values for my example... you'll want to use your own.

```
A>DDT CPM.COM
DDT VERS 2.2
NEXT PC
3100 0100
-IZCPR2.HEX
-R3980
NEXT PC
3100 0000
-GO
A>SYSGEN
DRIVE CONTAINING SYSTEM
(OR RETURN TO SKIP) (cr)
DESTINATION DRIVE (OR RETURN TO
REBOOT) A:
DESTINATION DRIVE (OR RETURN TO
REBOOT)
```

At this point you'll want to reboot your system and see if the ZCPR package comes up properly. The most obvious indication of ZCPR having successfully replaced the CCP is for the prompt to include the user number... assuming you've enabled this



feature. ZCPR should now perform as per the equates in the header file.

Further Adventures

There is a massive amount of stuff you can do with ZCPR and its utilities once it's up and working... there isn't room in this feature to even get into all this stuff. However, the power of just being able to manipulate the CCP will keep many users occupied for weeks. Once you get done with the various permutations of equates you can start playing with the source code itself if your karma is sufficiently adventurous.

I'm sure the author of the package would choke on this thought, but most people will have ideas about how to improve ZCPR2 for their own applications.

It's a good trip finding free software of this caliber. ZCPR2 is a complete party to work with... especially the first time you get the thing to boot properly. It makes a lot of things that were impractical under CP/M quite reasonable, and does in many of the inconvenient bits that scamper about the brains of many users for years. It only takes a few hours to hack... unless the fiberglass spirits infest your system and something goes wrong. Thereafter, it will be with you for life.

Or until you aren't state of the art any more. Give it a couple of months. **CNI**

BASterm for the IBM PC



The BASIC communications functions for the IBM PC, and, especially, for PC compatibles, are often less than useful and, in fact, frequently little more than test patterns for infrequently used error messages. Here's a way to circumvent the whole ordeal and get on line from BASIC.

by Steve Rimmer

BASterm for the IBM PC

Once you get into it... and manage to work your way through the manual to some extent... GWBASIC is a fascinating thing. It has stuff buried in there which few humans would even think of using, let alone actually including in a language. You can tell the electric trolls at Microsoft had been welling up their bizarre code for years before the PC came along.

One of the most reclusive of all the functions of the BASIC is its telecommunications drivers. If you stroke it nicely GWBASIC is *supposed* to be able to handle reasonably high speed dialogs with the machine's serial port and, through that, with the outside world.

In fact, this all works reasonably well on a real PC under ideal conditions, but it is usually found to be a cow of the first magnitude by owners of PC compatibles. In fact, most combinations of BASIC and illusionary blues produce a host of colourful device errors and almost no joy at all at three hundred baud and beyond.

There is a way around all this... at least, to some extent... by bypassing the nasty code. It takes some doing, though. The doing follows.

IN, OUT and Over

The IBM communicates with its serial port, at the machine level, through logical ports. A logical port is a hardware thing which allows one to exchange eight bit data with something peripheral to the main computer through two instructions, to wit, IN and OUT. They're almost self explanatory.

There are a thousand and some ports available to the IBM and, assuming that you've managed to discern which of them is connected to whatever it is you want to talk to you'll be able to have at it by IN'ing and OUT'ing to that number. BASIC provides analogous keywords, the command OUT and the function INP. You can think of them as being something like POKE and PEEK.

In fact, most physical devices don't use single ports, but, rather, fall over a range of them. This is described as a *base port* and an *offset*, which serves to confuse programmers equally as well as many very thick books. The base port is the lowest number port. The offset is the number between the base port and the port you're interested in.

The base port of the primary serial interface for the IBM is usually &H3F8. This is the first port for the 8250 chip which drives the serial interface. As it happens with 8250's, one port up from this there is always a port to set one of the baud rate divisor values, and two more ports up we find the other divisor register.

Thus, for example, the baud rate ports have an offset of one and three, respectively.

This is all unimportant when using the communications functions of GWBASIC... but, as we've noted, these don't always work. However, by knowing where the chip is located and how it operates we can bypass BASIC entirely and communicate directly with the hardware of the port through INP's and OUT's.

Alien Carpet Salesmen

The program in listing one is an example of how to manipulate the serial port directly from BASIC. It turns the PC into a terminal for calling bulletin boards. Despite its relatively placid demeanor, there are a number of interesting things happening here.

The heart of the software is the terminal routine that starts in line 670. It may look a little weird, partially because it has to do in BASIC things which are supposed to be handled in machine code.

Line 690 checks for remote console status, that is, it looks to see whether the computer on the far end of the wire has popped a

```

100 '-----
110 ' BASterm for the IBM PC
120 ' Copyright 1984 (c) Steve Rimmer
130 '
140 '
150 ' Uses COM1: hardware port access
160 ' incorporates special driver to
170 ' detect communications with
180 ' alien carpet salesmen.....
190 '
200 ' needs a Hayes Smartmodem or
210 ' something else that's cool
220 ' with the commands
230 '-----
240 '
250 '
260 DEFINT A-Z
270 KEY OFF
280 XPR = 0 'set to 1 for expert mode (no menu)
290 M$ = "P" 'set to P for pulse dial, T for touch tone
300 PORT = &H3F8 'change me to your port address
310 GOSUB 610 'initialize the modem port
320 GOSUB 420 'show the menu
330 GOSUB 790 'handle command line
340 IF PRI$ = "TER" THEN GOSUB 670 : GOTO 320 'be a terminal
350 IF PRI$ = "XPR" AND XPR = 1 THEN XPR = 0 : GOTO 320
360 IF PRI$ = "XPR" AND XPR = 0 THEN XPR = 1 : GOTO 320
370 IF PRI$ = "DOS" THEN CLS : END
380 IF PRI$ = "DSC" THEN GOSUB 1100 : GOTO 320
390 IF PRI$ = "MNU" THEN GOSUB 1150 : GOTO 320
400 IF PRI$ = "CAL" THEN GOSUB 1180 : GOTO 320
410 GOTO 320
420 'show the main menu
430 IF XPR = 1 THEN 600
440 CLS
450 PRINT SPACE$(25) CHR$(201) STRING$(26,205) CHR$(187)
460 FOR X = 1 TO 5
470 PRINT SPACE$(25) CHR$(186) STRING$(26,32) CHR$(186)
480 NEXT X
490 PRINT SPACE$(25) CHR$(200) STRING$(26,205) CHR$(188)
500 LOCATE 3,29 : PRINT "BASterm for the IBM PC"
510 LOCATE 4,31 : PRINT "Copyright 1984 (c)"
520 LOCATE 5,35 : PRINT "Steve Rimmer"
530 LOCATE 8,35 : PRINT "Main Menu"
540 PRINT SPACE$(30) "DOS Exit to system"
550 PRINT SPACE$(30) "MNU See modem command menu"
560 PRINT SPACE$(30) "XPR Toggle off menu"
570 PRINT SPACE$(30) "CAL Dial a number"
580 PRINT SPACE$(30) "DSC Hang up the phone"
590 PRINT SPACE$(30) "TER Terminal"
600 RETURN
610 'initialize modem for 300 baud
620 OUT PORT+3,&H80
630 OUT PORT,&H80
640 OUT PORT+1,1
650 OUT PORT+3,&H1A
660 RETURN
670 'be a terminal
680 PRINT : PRINT "[ Terminal On Line. Hit ESC to exit ]"
690 C = INP(PORT+5) : IF C = INT(C/2) * 2 THEN 730 'no remote character waiting
700 C = INP(PORT) : IF C > 128 THEN C = C - 128 'mask parity bit
710 IF C = 8 THEN LOCATE ,POS(U)-1 ELSE PRINT CHR$(C);
720 IF C = 13 THEN PRINT CHR$(10);
730 C$ = INKEY$ : IF C$ = "" THEN 690
740 C = ASC(C$) : IF C = 27 THEN 770
750 OUT PORT,C
760 GOTO 690
770 'exit terminal mode... oh no, an alien carpet salesman!!!!
780 RETURN
790 'handle the command line
800 PRINT CHR$(13) STRING$(4,10) "Command";
810 INPUT C$ : C$ = C$ + " " : GOSUB 880 'convert to upper case
820 IF C$ = " " THEN PRI$ = "?" : GOTO 870
830 T = INSTR(C$," ")
840 IF T = 4 THEN PRI$ = LEFT$(C$,3) : GOTO 860
850 PRI$ = LEFT$(C$,1)
860 IF T = 4 AND LEN(C$) <> 2 THEN SEC$ = RIGHT$(C$,LEN(C$)-4)
870 RETURN
880 'convert a string to upper case
890 FOR X=1 TO LEN(C$)
900 C = ASC(MID$(C$,X,1))
910 IF C > 96 AND C < 123 THEN C = C - 32 : MID$(C$,X,1) = CHR$(C)
920 NEXT X
930 RETURN
940 'issue a modem command
950 GOSUB 1000 : GOSUB 1000 'wait one second
960 C$ = "+++" : GOSUB 1040 'send the string out
970 GOSUB 1000 : GOSUB 1000 'wait one second
980 C$ = MODEM$ + CHR$(13) : GOSUB 1040 'send the string out
990 RETURN
1000 'wait for seconds counter to change
1010 C = VAL(RIGHT$(TIME$,1))
1020 IF VAL(RIGHT$(TIME$,1)) = C THEN 1020
1030 RETURN
1040 'send a string out to the modem
1050 FOR X = 1 TO LEN(C$)

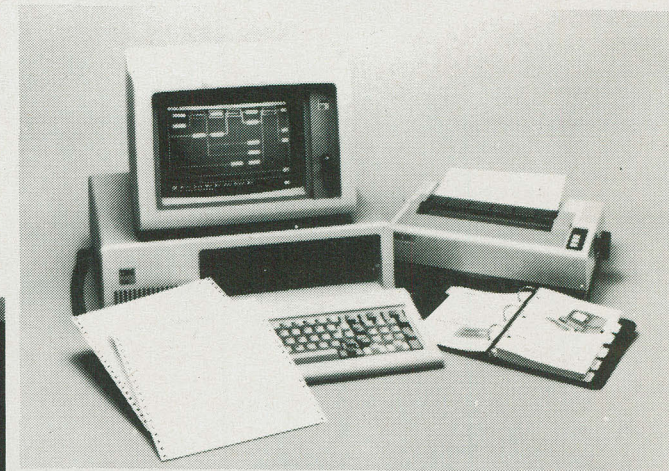
```



```

1060 OUT PORT,ASC(MID$(C$,X,1))
1070 FOR Y=1 TO 50 : NEXT Y
1080 NEXT X
1090 RETURN
1100 'disconnect the phone line... it's the broadloom attacking
1110 MODEM$ = "ATH" : GOSUB 940
1120 PRINT "[ Disconnected ]"
1130 GOSUB 1000 : GOSUB 1000
1140 RETURN
1150 'show the modem's menu...
1160 MODEM$ = "AT?" : GOSUB 940
1170 GOTO 670 'go to terminal to see menu
1180 'dial a number... no deep shag from venus
1190 PRINT : PRINT "Preparing to dial " SEC$
1200 IF SEC$ <> "" THEN MODEM$ = "ATD" + M$ + SEC$ : GOSUB 940 : GOTO 670
1210 RETURN

```



character down since the last time it checked. It's fairly easy to determine this... the 8250 sets bit zero in the byte at the fifth port up when there's a character waiting.

As it turns out, bit zero having a value of one, we can test to see if the bit is set by seeing if the byte is odd or even.

If there is no character waiting the program loops around to see if there is a local character waiting at the keyboard to be sent out to the modem. If there's no life locally either it will come back to the remote check, and keep looping back and forth until somebody wakes up.

If there is a remote character on hand, the program gets it by

inputting data from the base port. The base port data is always valid if the zero bit of the status port is set... but only until the first time it's read out.

Line seven hundred masks the parity bit, which is the high order bit of the inputted data byte. Again, this is easy to do in machine language, but trickier in BASIC. Since the high order bit raises the value of the byte by a hundred and twenty-eight if it's set it can be essentially masked by knocking down anything over a hundred and twenty-eight.

Other tricky bits include the backspace, character eight.

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Most remote systems send one out to move the cursor to the left, and most terminals interpret this as what it purports to be. The IBM doesn't... it prints a graphics character when it gets a backspace. Line 710 traps these things.

Likewise, line 720 adds line feeds to carriage returns... the IBM likes to have this handled for it, the lazy sloth.

The local part of the terminal is a lot easier to understand, simply checking the keyboard status and, upon getting something sending it out to the port. This is a bit sloppy... one should check to see if the port's ready to catch it... but you can get away with doing it this way at low speeds.

Most of the rest of the program is human engineering and command handling. The terminal will, for example, dial for you if it's connected to a Hayes compatible smart modem. The command for this is

CAL 423-5149

You'll have to change M\$, up in line 290, if you have a touch tone phone.

The MNU command is another Hayes compatible function. It will ask the modem for a list of its internal commands, and then pop you into terminal mode so you can see them spewing back in through the serial port. This is handy when you're debugging the program and there isn't anything to call.

No Bawdy Tales

It's probably fair to say that BASTerm is something of a pink plastic flamingo on the unkept lawn of technology. I would certainly say it, anyway, and you might well too, for want of something more articulate. Anyone in earshot will be suitably perplexed, which is probably good.

In fact, BASTerm, in its interpreted form, suffers from the occasional loss of data. It only just cuts it at three hundred baud and, of course, is quite the rusty Ford beyond this. It's a lot better when it's compiled.

Despite its limitations, however, BASTerm is a workable alternative to using BASIC's communications drivers which, slick and profound though they may be, are often hampered by their being largely non-functional. It's a quick and nasty fix, which are always the best kind.

Furthermore, BASTerm is really simple, and, as such, you'll have no problems in modifying it to do other things. You might want to consider adding up and download capabilities, a phone number library or an automatic logon routine. All the bits are in residence... all you have to do is to figure out how you want to arrange them.

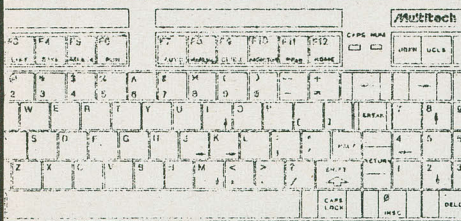
This is also true of the characters that it receives. There's a great novel in there somewhere... all you have to do is to figure out the arrangement of the letters.

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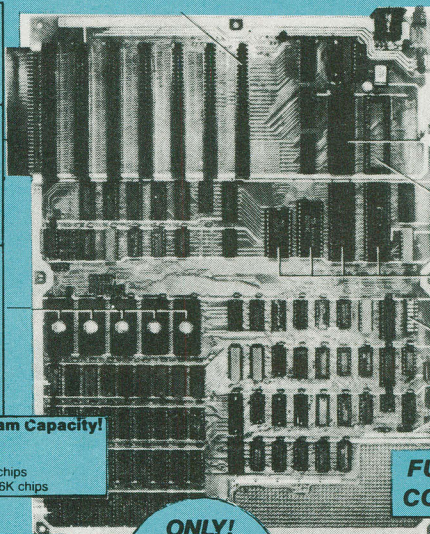
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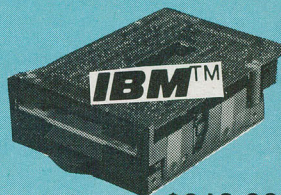
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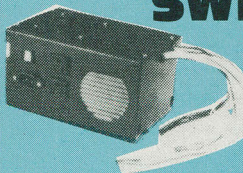
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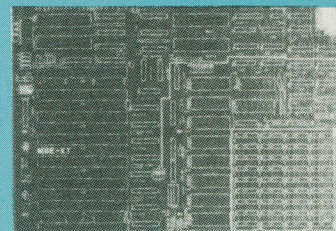
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Mixing Up a Modem Program



There are about a zillion variations on the theme of the basic modem program... well, almost a zillion, anyway. Here's a look at the variations.

by Brian Greiner

There has been a lot of talk about an electronic nation, where people will transfer information to each other via computers. Well, in actual fact, computer users have been doing this for years, exchanging software as well as messages.

What is required for someone to do this

is, first of all a computer, a modem and a telephone line. A modem is a piece of electronic magic that converts the computer's bits to beeps that can be transferred over a standard telephone line. The other ingredient of this seemingly magical combination is the software that tells the computer how to

talk to other computers.

Now, you can go to a store and spend a hundred dollars or more (usually more) for a telecomm software package. Or, you can dip into the pool of public domain software and get a variety of software packages to suit your needs, without having to pay



Modem programs can link computers with unusual disk formats.

anything at all. And the free software is supremely better than the commercial stuff!

Now that I've gotten your attention, I'll tell you about three of the more popular public domain telecomm programs for CP/M and one for the IBM PC.

Modem Seven and a Half

The very first telecommunications package was written in 1977 by Ward Christensen, and was called MODEM (he also started up the first BBS). It was primitive, but worked well enough that other people started to use it. And to modify it. And add to it. And modify it again and again and again. So, what we have today is a program called MDM740 that has just about all the features anybody could want.

Like all telecomm programs, it essentially allows the computer to act like a remote terminal. But it also allows your computer to dial a number from a built-in library of numbers, and even dial from 1 to 32 different numbers sequentially until one of them answers. It can transfer files (called 'uploading' and 'downloading') using a special protocol called the XMODEM or Christensen protocol. This protocol allows for the checking of the data to ensure that no errors occur during the transmission.

MDM740 allows for both checksum and CRC (cyclic redundancy check) error checking. It also allows for the transfer of data without error checking, and can send such data either to a disk file or to a printer. MDM740 even allows automatic multiple file transfers.

From within MDM740 the user can list the directory of any disk and erase any file.

There are also a number of minor features of interest only to the users of the program. Suffice it to say that MDM740 is a very complete package that works very well.

What makes MDM740 (or any of the MODEM series) so widespread is that it can be made to run on just about any computer that uses the CP/M operating system. The key to all this is that the basic program requires an 'overlay' file that tells it how to talk to a specific computer. The overlay is a small file that defines certain machine-specific parameters and supplies subroutines that allow MDM740 to talk to that specific machine.

There are overlay files written for just about every CP/M computer in existence. The reason for the name is that this extra file is a template that is put onto the main program, and can be easily changed to suit the application. The overlay process can use either the DDT utility or its equivalent, or a special program called MLOAD.

The 'new boy' program is MEX, and it has even more features than MDM740. The phone library can be stored and recalled as a disk file, so that multiple libraries can be used. As well, the phone libraries can be altered from within MEX; MDM requires a special utility program. Phone numbers can be called in a desired sequence until one answers, and each number can be repetitively redialed any number of times.

The user can easily check and modify a large number of system variables, many of which in MDM were changeable only in the source code. The user can even save the current version of MEX (complete with the changed system variables and phone

library) as a new file. This allows the creation of application-specific versions of MEX. One can even define a command file that can control the operation of MEX, even to the extent of unattended operation.

Basically, the difference between MEX and MDM740 is one of degree. They are essentially the same, but MEX combines the features of MDM740 along with the features of several of MDM740's auxiliary utility programs. MEX also allows for a greater control over the system parameters. In use, they are both very similar. The choice of which one to use is largely subjective. I've used both and prefer MDM740, mainly because I'm familiar with it, and don't really require the added power of MEX.

I can see future applications where MEX is the only suitable tool to use. These are both superb packages, very similar in operation, that are equal to commercial packages costing hundreds of dollars. Both are written in assembly language, as are their overlays.

Mode Modems

Then there is YAM; Yet Another Modem package. This package is written in the C language, and as such has developed a small cult of followers. I haven't used this package, mainly because I don't know C, but will mention it because it has achieved a certain popularity.

Also, being written in C, it should be fairly easy to transport to a number of different machines and operating systems. The latest version that I can find is version 3.13; it requires BDJ-C version 1.50 or better to compile it.

From what I can gather from looking at its documentation, YAM has the features of MDM740 plus the ability to twiddle more of the system parameters. However, it does not seem to be as powerful as MEX. It consists of a number of source files, one of which must be modified to work with the computer's hardware, similar to the overlay file required by MDM and MEX. There seem to be overlay files for about half a dozen or so different computer systems available.

All in all, for anybody running under CP/M, I'd have to recommend using either MEX or MDM740. They are both powerful, reasonably bug-free, and available for a very large number of different computer systems.

As with most other things, it took a while for the IBM PC community to match the communications ability of the CP/M systems. Although there are versions of MODEM around for both PC-DOS and

This Month in Software Now!



This month's Software Now! features a look at those quintessential galley slaves of the modern office, the data base managers. There are about a million of these things available... we're featuring an extensive survey of what's extant upon our globe.

We'll be checking out Condor and Zim for the IBM PC, two more data base managers you'll want to consider.

There's also a look at using dBase II, perhaps the most widely known data base package every written.

In addition to all of this business karma, Software Now! will be featuring a look at some disk back up utilities... copying programs to the rabble... for the PC and the Macintosh. There are graphics and a geneological package for the apple and a special arcade feature on flight simulators for the PC, the Apple, the Commodore and the TRS-80.

You won't want to miss this exciting edition of Software Now!. It's available on newsstands everywhere.

Mixing Up a Modem Program

CP/M-86, they tend to be extremely primitive and awkward to use. The telecomm winner for the PC appears to be PC-TALK running under PC-DOS. Written in BASIC, the program can be run using the BASIC interpreter or run through a compiler. The compiled version is, of course, a lot faster and capable of handling higher baud rates. I've used the compiled version at speeds of 9600 baud with no problems.

By and large, I only use it to transfer programs between my CP/M and IBM systems, for a number of reasons. It's overall not as nice to user as MDM740 or MEX. While it has some nice features, it's nowhere near as flexible as MEX, and is definitely more awkward to use. Some of this is purely subjective, of course, but it's also the opinion of others that I know who have used both types of programs.

PC-TALK features both XMODEM protocol and text-capture data transfers, a phone number library and autodial, multiple baud rates (but you cannot change in the middle of call) and numerous minor features similar to the MODEM series of programs. The source code, as well as the compiled version, are readily available.

My biggest complaint about PC-TALK is that it is not strictly speaking in the public domain. The IBM PC fad has spawned a nasty variant of public domain software, called freeware. The program is offered to the public at large for use, including copying it and giving it away to friends. However users are encouraged to send in a 'contribution' to the author if they like the program. Yech.

The reason that MDM740 and other truly public domain programs are so good, is that the authors released the source code to the world for absolutely free. Over the years, a good idea just got better as other people modified, fixed, and improved upon the original code, and released the new code back into the public domain. All without thought of material reward.

In comparison, most of the utility software for the PC is not released with the source code. Sometimes the source code is available once the contribution is received, but it's often not available at all.

Disconnect

There's a public domain telecommunications software package available for just about everyone, no matter what sort of computer you've got. But what do you do once you've got it? Start calling up the bulletin boards, see what other people are doing out there, share knowledge and ideas.

CNI

How the Christensen/XMODEM Protocol Works

A protocol is simply a previously agreed upon method of transferring data. The Christensen/XMODEM protocol has become a standard mainly because it is a well defined, easily implemented protocol that works. And, of course, because there are a lot of people using it. Unfortunately, not too many people understand how it functions.

To begin with, the transmitted data is broken up into 'sectors', with 128 bytes of data per sector. Each sector is preceded by a special character called the SOH (start of header) character and two bytes that define the sector number.

After the header and sector are transmitted, an error-detection code is sent. This can consist of one byte if the checksum technique is used, or two bytes if the CRC (cyclic redundancy check) technique is used. More on these later.

On the receiving end, once each sector is received the receiving computer calculates what the checksum byte or CRC bytes should be. The calculated result is then compared with the number received. If the two values agree, a special ACK (acknowledge) character is transmitted, and the transmitting computer then sends out the next sector. If the two results do not agree, the receiving computer sends out a NAK (negative acknowledgement) character, and the transmitting computer sends out the sector again.

Usually no more than 10 to 15 retries are allowed, but this can be controlled by the user. All this fancy stuff is done so that one can transmit information and have some assurance that it was received without errors.

The checksum is calculated by summing the SOH character, the block number, the block number's 2's complement and each of the 128 bytes of data to produce a one byte 'sum'. This technique is easy to implement and is reasonably good at catching transmission errors.

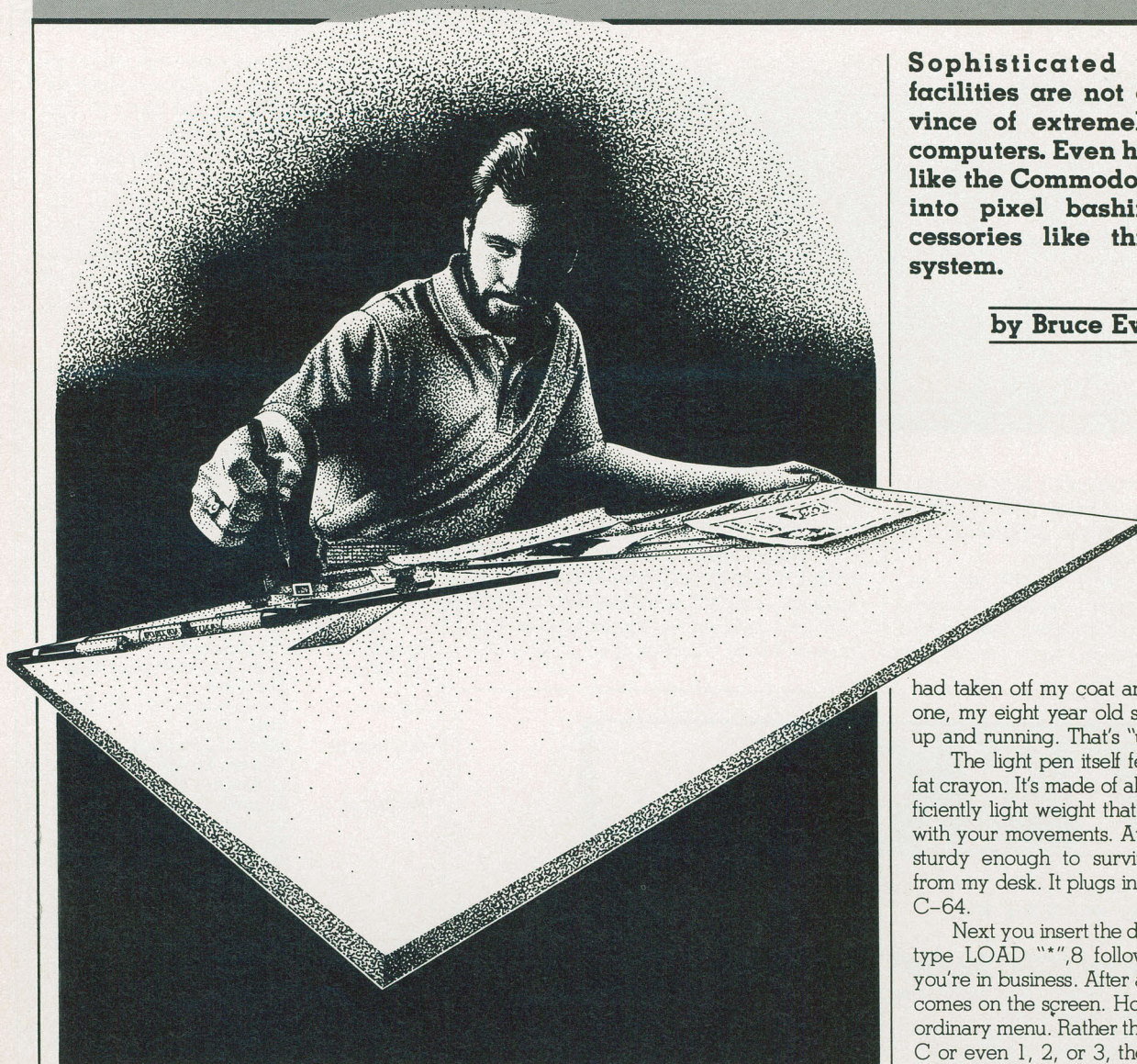
The CRC technique is more sensitive to transmission errors, but is a lot harder to implement. It uses a lot of fancy mathematics involving information theory and polynomials. Suffice it to say that it corresponds to the CCITT CRC-16 Standard. Use it if you care about your data.

CNI

Flexidraw for the Commodore 64

Sophisticated graphics facilities are not only the province of extremely expensive computers. Even home systems, like the Commodore 64, can get into pixel bashing with accessories like this light pen system.

by Bruce Evans



Many people are scared off computing by the keyboard. To be comfortable with a computer, you must know how to type. Hunting and pecking over an illogically laid out keyboard is frustrating. Children often lack the motor skills or even the hand breadth for typing. For many disabled people, the promise that the personal computer holds out is squashed by its keyboard.

One of the simplest ways to bypass the keyboard is with a light pen. You plug this device that looks like a fat pencil into your computer. Then when you place the pen on the CRT screen, the computer is able to recognize where the pen is and interact with it. In fact, it is a light sensitive device. Since

the program knows internally which dot on the screen is active at any point, it can determine where the pen is.

Unfortunately, until now, most available light pens have been little more than toys. Worse, there has been almost no software available to run these limited devices. Inkwell Systems has overcome all this with their *Flexidraw* system.

Picture Perfect

Flexidraw comes in a 4" by 8" box containing everything you need. You'll find the light pen itself, a floppy disk and a 60 page instruction book. Don't let that 60 pages scare you off. You don't need a degree in engineering to use this system. By the time I

had taken off my coat and grabbed a cold one, my eight year old son had the system up and running. That's "user friendly."

The light pen itself feels like an empty, fat crayon. It's made of aluminum and is sufficiently light weight that it doesn't interfere with your movements. At the same time, it's sturdy enough to survive numerous falls from my desk. It plugs into port one of your C-64.

Next you insert the disk into your drive, type LOAD "*",8 followed by RUN and you're in business. After an eternity, a menu comes on the screen. However, this isn't an ordinary menu. Rather than choices A, B, or C or even 1, 2, or 3, there are only boxes beside each choice. Merely move your light pen to the box you want and the program you chose runs.

Next, you'll see a vertical line in the middle of the screen. Center your light pen over this line. This lets the program calibrate itself. After an annoyingly long time, the rest of the program loads. Waiting for the program to load will be the last time you'll be annoyed with any of the programs in this package. From here on, it's all amazement and enjoyment.

There are five programs on the disk. *Flexidraw* is the master program. It's a high resolution black and white graphics program similar to *MacPaint* on the Macintosh. *Flexiplot* contains subroutines for *Flexidraw* to call to create graphs and plot math functions from BASIC. *Penpalette* paints the pictures and graphs created with *Flexidraw* and *Flexiplot* in 16 colors. *Transgraph*

Flexidraw for the Commodore 64



transmits and receives your high resolution graphics over a modem. Finally, *Sprite Editor* constructs sprites and saves their values for BASIC programs.

In addition, there's a light pen piano and music synthesizer. The piano program is similar to an organ program that uses the keyboard keys as piano keys. I'm not sure

what I'd use the synthesizer program for but it sure impresses people who usually are turned off by computers.

If you've seen or used the *Koala Pad* and Macintosh's *MacPaint*, you'll know what *Flexidraw* does. It has the usual commands to let you make circles, squares and boxes. You can "zoom" a portion of your picture so

that it fills the whole screen. Then you can make modifications as small as one pixel that are transferred to the large picture. This feature is much more accurate and useful than the same command in the *Koala Pad*. However, you can also enter text and alphanumeric characters from the keyboard. It even allows all the graphics and control character sets. Also, there are grid and cross-hair functions to let you use graph paper or line up items on the screen.



Specs

Package:	Flexidraw
Application:	Light Pen and Graphics Software
System:	Commodore 64 with 1541 disk drive
Manufacturer:	Inkwell Systems, 7770 Vickers Street, San Diego, California 92138
Distributor:	Romaro Enterprises International, P.O. Box 227, Streetsville Postal Station, Mississauga, Ontario L5M 2B8 (416) 858-1400
Price:	\$249.95

Drawing

The simplest mode of drawing is using your light pen freehand just as you would sketch or doodle on a piece of paper. On other systems your lines never seem smooth and straight. This is due to writing on a vertical surface—not the usual mode of writing. *Flexidraw* has an "average" function to smooth out these lines. You can even sign your name with this.

When you're drawing, you have the choice of two "pages." Either one can be displayed on the monitor screen. Each page takes up the left two thirds of your screen. On the right, there's a menu of your commands. As you choose a command with your pen, the command changes color so you know what options are in effect.

But wait a minute. There are too many commands! That's not a problem. Some options such as PIXEL and GRID are mutually exclusive, so if you touch that space, the two will toggle back and forth. Other options are part of what Inkwell Systems calls a

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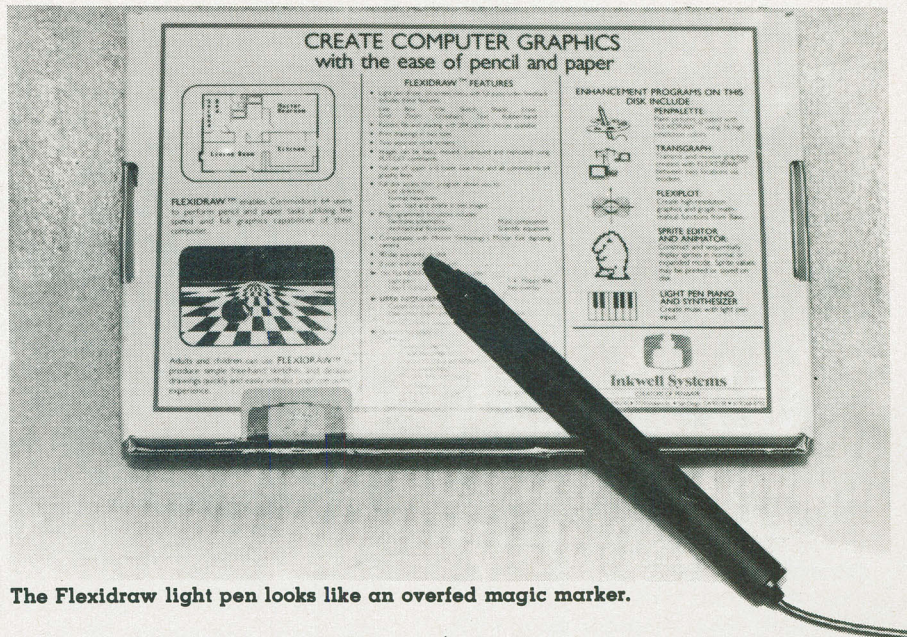
Circle No. 47 on Reader Service Card.

"dynamic menu." Thus, if you touch FILL, the lower command will be replaced by a display of all the fill patterns available. You just choose the one you want with the light pen. Once you're finished, this menu changes back to your original one. Inkwell systems has included four preprogrammed templates for electronic schematics, architectural floorplans, music composition and scientific equations. You can use these functions to create illustrations for slides and manuals. In addition, you can create your own templates for recurring uses.

At this stage, you may be as disappointed as I was at first seeing the *Macintosh*. The graphics are super, but they're all in black and white. What's the good of a color monitor? Wait and see.

Pen Palette lets you take black and white drawings and color them. In this program, you load the previous drawings onto a new "page." Now, instead of the earlier menu on the right, there are 23 "paint pots" to let you color your work and its background. Once again, commands, changing colors and drawing are all done with the light pen.

Once you have finished, you can save your work on disk. But this isn't the end of it. You can call these drawings from your BASIC programs. Not only this, but you can animate them by changing colors. There's an excellent example of this as a demonstration. You get a drawing of a pumpkin with witches and lightning. The BASIC program changes the background colors making the detail disappear and re-appear at will.



The Flexidraw light pen looks like an overfed magic marker.

To anyone writing games professionally, the sprite editor is worth the price of the entire package. One of a C-64's strengths is its sprite control. But many a potential game has been ruined because the author didn't understand sprites. With this program, you use *Flexidraw* and *Pen Palette* to create your sprites and then press F2 and the program will display the poke values for your sprite. It'll even print them out on your printer for you. What more could you ask?

What good would all this choice be if you couldn't use it? Well, don't worry about that. Inkwell System's documentation is

superb. As I mentioned earlier, my eight year old son had the system up and running in minutes. This doesn't mean, though, that the system is geared to a youngster. It means that the system has many layers of complexity. This is mirrored by the instruction manual.

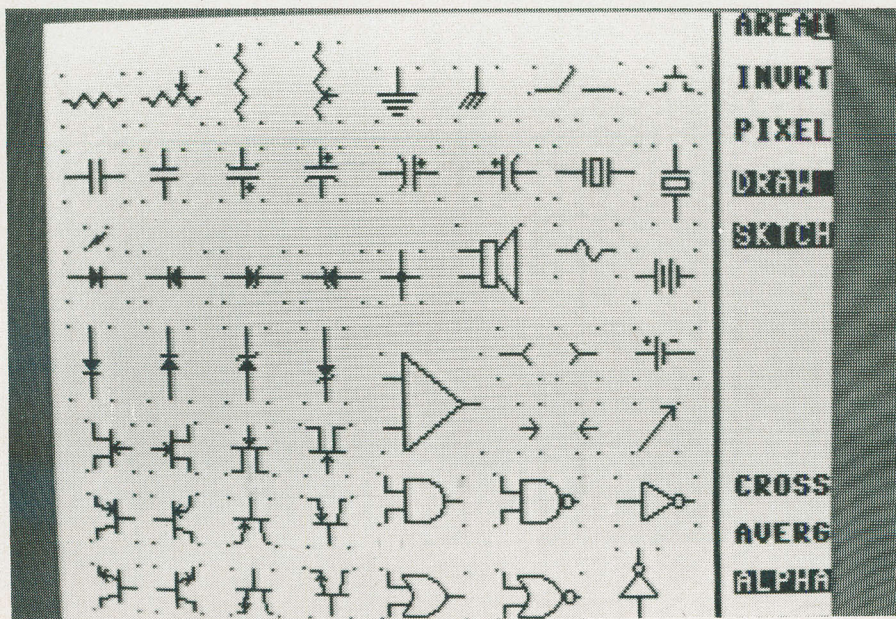
This manual could be used as a model of instruction writing. It starts with a comprehensive index. Each topic is set out in a separate section. Each section is developed with a consistent format. First you are told how to use the program. Then you're given a quick and dirty trial run. Next there's the detailed nuts and bolts. Depending on your interest and ability, you can stop anywhere along and still get a great deal out of your system.

The Last Line

Are there any drawbacks to *Flexidraw*? None that I could find. That's a bit embarrassing to me. As a reviewer, I'm supposed to find the flaws and limitations.

In summary, Inkwell Systems has come up with a system that has almost unlimited scope. They have tried to be all things to all applications and pulled it off. Oh, you could get a better system by buying a Macintosh with *MacWrite* and *MacDraw* plus a Hewlett Packard personal computer with a \$5000 to \$10,000 CAD/CAM system plus an Apple with a *Koala Pad* plus... See my point? For around \$250.00, you can enter a whole new world, unimpeded by a keyboard. I bought my Commodore 64 to run a *Koala Pad*. If *Flexidraw* had been available then, I'd have bought my C-64 years earlier. **CNI**

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A page of symbols for Flexidraw.

New—Sinclair QL

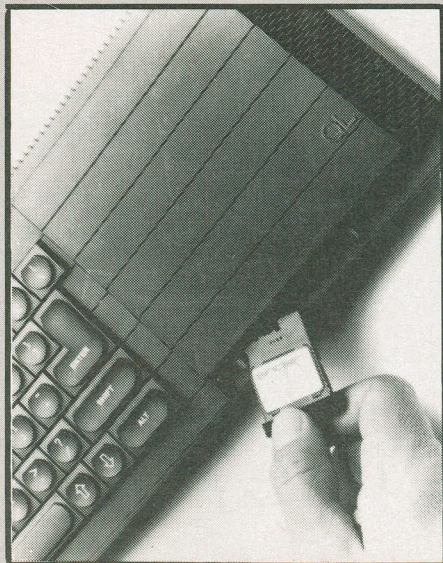
- * 32-bit processor
- * 128K memory
- * two built-in microdrives
- * high resolution colour

Includes software:
word-processing
database management
spreadsheet
graphics

The Sinclair QL revolutionizes the computer revolution. It offers the utmost in performance, speed and power at the remarkably low price of only \$799.95.

The QL is a full-size computer designed around the most powerful and advanced microprocessor yet created for the personal computer: the Motorola 68008. With 128K RAM, expandable to 640K. Two built-in Microdrives. Networking. A full-sized QWERTY keyboard. And its own operation system — QDOS — which accommodates windows and even multi-tasking. High resolution colour or black and white display, on either monitor or TV. Two RS-232C serial interfaces. Joystick cursor control.

That's just the hardware. The QL also comes with all the software you need to get started right away doing useful work. Word processing. Spreadsheet. Graphics. Database management. A powerful set of programs as sophisticated and as easy to use as any on the market.



Powerful Processors

The 68008 is already the favourite choice of software designers for its speed and flexibility. Its 32-bit architecture virtually guarantees the QL will never become outdated, and that wide software choices will be available in the future.

A second processor, an Intel 8049, controls the keyboard, generates the sound, and acts as an RS-232 receiver.

New Operating System

QDOS resides within the QL's 32K ROM. It is a single-user multi-tasking, time-sliced system using Sinclair SuperBASIC as a command language. Multi-tasking allows you to run several programmes individually and simultaneously, a feature normally found on computers costing at least 10 times as much as the QL.

128K Memory Expandable

The QL comes with a generous 128K of internal RAM, more than enough for the largest programmes you'll want under ordinary circumstances. An optional expansion board can turn your 128K into 640K simply and inexpensively.

Professional Keyboard

The QL keyboard is designed for fast, accurate input of data and programmes. It is a full-size QWERTY keyboard, with 64 keys, including shift keys, five function keys, and four separate cursor control keys. Key action is positive and precise.

The Microdrives

The QL's cartridge tape storage system is very much a part of the Sinclair revolution. For the first time floppy disk performance has been matched in a compact medium far less expensive to own. Depending on programme length, load time is 10 to 20 times faster than cassette. The rate of data transfer is actually a little faster than floppy disk. You can store up to 50 files, or 100K, per cartridge. Microdrive maintains an index so you can see exactly what's on any cartridge.

The QL has two built-in Microdrives, with expansion of up to six more.

A New Basic

The Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allows the QL's full power to be exploited. Procedure facility allows code to be written in clearly-defined blocks. Extendability allows new procedures to be added which will work in exactly the same way as the command procedure built into the ROM with which you're already familiar. Constant execution speed means SuperBASIC won't get slower as your programmes get larger. Instead, long programmes run much faster than with other Basics.

Incredible Extra Features

The QL features built-in networking capability for up to 64 QL computers. Set up local area networks of QL computers to swap information, ideas and programmes, shared over the network at 100K baud.

High resolution graphics? Up to 512 x 256 pixels (4 colour), 256 x 256 (8 colour). ROM expansion? The QL will accept an additional 32K ROM cartridge.

Included — QL Pro

Four fully-interactive programmes designed especially for the QL. Data from one programme can be transported to another. For example,

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Spreadsheet

QL Abacus makes simultaneous calculations and "what if" model-construction easier than they have ever been. Refer to rows, columns, and cells by names, not just letters and numbers. Function keys can be assigned calculations with a single key-stroke. On screen prompts and Help menus simplify operations. You can link spreadsheets, use multiple windows, vary column width and justification of text. Scroll windows jointly or separately, horizontally or vertically. There are many more features!

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figures from the spreadsheet can be transferred to the Graphics programme for an instant visual presentation!

Database management

QL Archive is an extremely sophisticated yet easy to use filing system using a language even simpler than BASIC. You can define relationships, extract data and reorganize it, do statistical and accounting calculations and more. Screen editor allows you to design your own screen and format reports. Procedure and programmes may be written and saved for repeated use. Choose from 84 command words for queries, cross-reference entries, and search any number of files. Easy-to-use since everything is performed within the framework of familiar information prompts and Help menus.

Graphics

Spectacular colour graphs are easy to create with single key-stroke commands. QL Easel does not require you to format display before entering data; it handles design and scaling automatically or under your control. There are nine graph styles. Text can be added or altered as simply as data. QL Easel can also manipulate and evaluate data using a series of command math functions and formulas.

Getting the most from your QL

Your QL is supplied with a comprehensive set of manuals that make learning not only painless, but truly enjoyable. The QL manual includes a SuperBASIC reference manual, programming tutorial, and complete guides to the software. The manual also contains details of QL's comprehensive 90-day warranty, and service information.

Here is what you get:

Your QL comes complete with power supply, cables, manual, software and blank Microdrive cartridges. You will also receive information on the Canadian QL Users Club — available only to purchasers within Canada. Please remember as well that only QL's purchased in Canada can be serviced under the terms of the warranty. All orders will be acknowledged by return mail. Due to anticipated heavy demand please allow 4-6 weeks for delivery.

EDG offers a **7-day money back guarantee** on QLs purchased directly from us. The QL may also be available through local dealers in 1985.

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Future Developments

Future QL products under development include a "C" compiler. 68000 assembler. Terminal emulator (that will allow you to tie your QL into a mini or even a main-frame computer). A 0.5Mb memory expansion board. Analogue-to-digital converter that could turn your QL into a home sound studio. Winchester hard disk interface. Parallel printer interface. IEEE-48 interface for engineering and scientific applications.

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COMPUTER PRESS

Hewlett-Packard has announced a version of Ashton-Tate's **dBASE II** for the **HP Portable**. The package includes a user's manual, demonstration disk and sample programs, and is available from through authorized HP dealers...
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Hayes Microcomputer Products, Inc. has announced the **Smartmodem 2400**, a high-speed, synchronous/asynchronous modem built to CCITT international standards. While the modem can transmit at 2400 baud, it automatically adjusts to lower speeds of 300, 600, 1200 and 1800 baud when necessary...
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Emulex Corporation has introduced two Persyst peripheral cards for IBM personal computers. The **PC/Memory Plus Clock** board allows 0 to 576K of add-on RAM, comes with supporting software, has an on-board five-year battery, and provides time/date stamping, split memory addressing and a software 'lock'. The **PC/Short Memory** board mounts in the short expansion slot and provides up to 384K of RAM...
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Vendors distributing software over the phone can protect their programs and companies with mainframes can lock out unauthorized users with **The Key**, a product of **Staff Computer Technology Corporation**. The hardware may be implemented by any computer with an RS-232C port...
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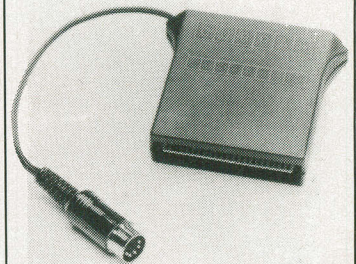
Glimpix is the first in a series of three-dimensional quick reference guides from **Fogware**. Displaying all the commands and intricacies of **dBASE II**, the guide stores flat, but 'pops' up into a 14 sided geometric shape. Owing to its shape, the guide is easier to use (and more difficult to lose) than a flat booklet-type reference guide...
Circle No. 54 on Reader Service Card.

The **Data I/O Series 22** prom programmer from **Allan Crawford Associates Limited** comes with everything needed to program MOS Eproms. Included are 27 data formats, full data manipulation, an RS-232 interface and computer remote control...
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While detachable keyboards provide some freedom of typing positioning, one's lap can prove unsteady. The **K-Board** from **Canadian Word Processing Supply Limited** clamps to the user's desk and is adjustable to a level comfortable to the individual user...
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Providing back-up storage capacity of 60 megabytes, the **Tallgrass TG-4060** cartridge tape storage unit is 100 per cent compatible with the IBM PC/AT. The unit is available from **Tallgrass Technologies Canada**, who are also offering a \$15.00 upgrade to users of Tallgrass HardFile mass storage systems upgrading to the PC/AT...
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When plugged into the cartridge port of the Commodore 64, the **Voice Messenger** gives the computer an infinite vocabulary with two voice selections and intonation. The synthesizer, manufactured by **Currah Technology**, outputs through the computer to the TV speaker...
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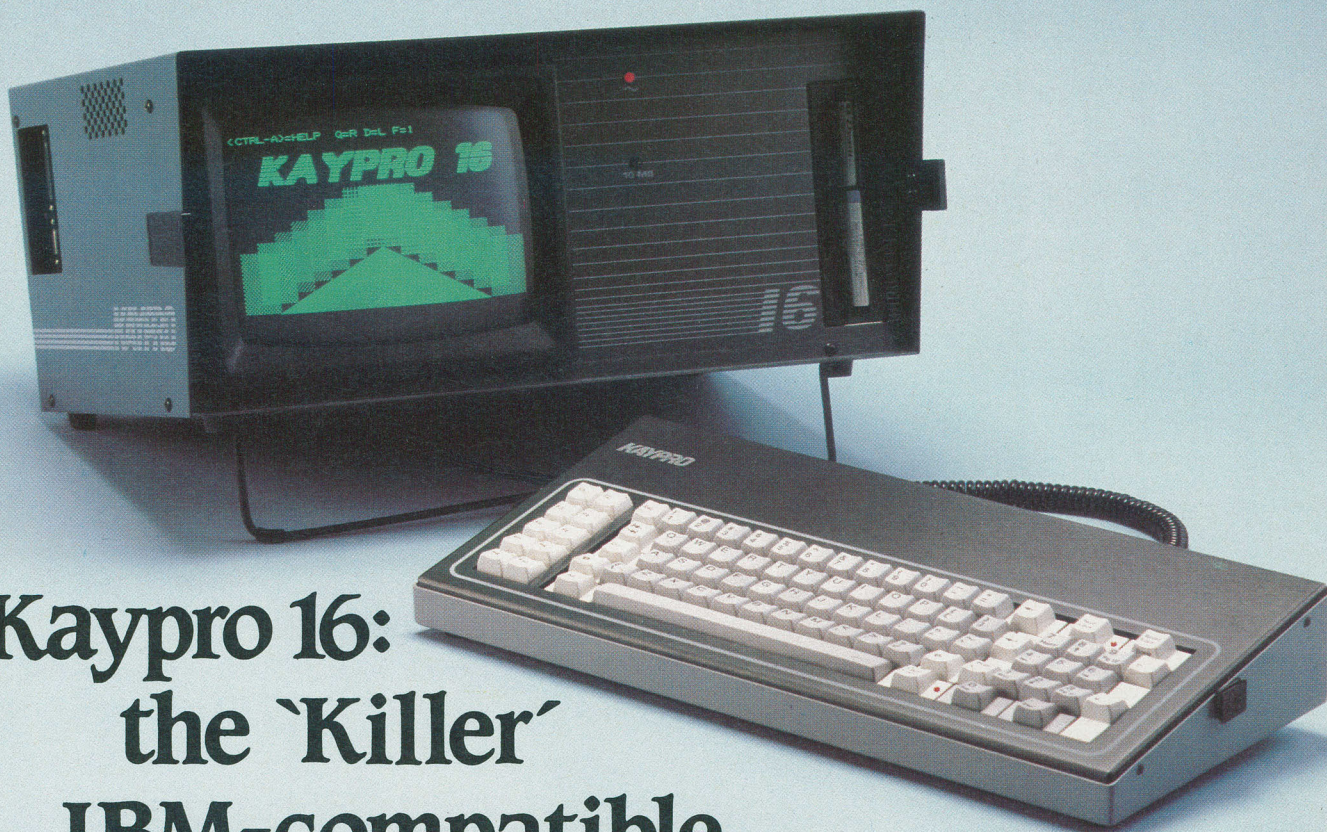
A multifunction card for the IBM PC/AT, **Profit Systems' AT-Power** allows up to four megabytes of RAM to be added to the computer. In its base configuration, the card has 128K RAM, a serial and parallel port, with an optional second serial and/or joystick port...
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The new series of **radiation shields** from **ACCO** are formulated to prevent possible X- or ultra-violet radiation from CRTs. Comprised of a blend of acrylic and lead, the shields also each have an inherent anti-glare filter...
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